



Maintenance & Service Guide

HP Pro 2000 Business PCs

HP Pro 2080 Business PCs

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Maintenance & Service Guide

HP Pro 2000 Business PCs

HP Pro 2080 Business PCs

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About This Book

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- ⚠ **WARNING!** Text set off in this manner indicates that failure to follow directions could result in bodily harm or loss of life.
 - ⚠ **CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.
 - 💡 **NOTE:** Text set off in this manner provides important supplemental information.
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Table of contents

1 Product Features	1
Standard Configuration Features	1
Serviceability Features	2
Front Panel Components	3
Media Card Reader Components	4
Rear Panel Components	5
2 Installing and Customizing the Software	6
Installing the Operating System	6
Downloading Microsoft Windows Updates	6
Installing or Upgrading Device Drivers (Windows systems)	7
Accessing Disk Image (ISO) Files	7
Protecting the Software	7
3 Computer Setup (F10) Utility	8
Computer Setup (F10) Utilities	8
Using Computer Setup (F10) Utilities	8
Computer Setup—Main	10
Computer Setup—Advanced	11
Computer Setup—Boot	12
Computer Setup—Power	13
Computer Setup—PC Health	13
Computer Setup—Exit	14
4 Serial ATA (SATA) Drive Guidelines and Features	15
SATA Hard Drives	15
SATA Hard Drive Cables	15
SATA Data Cable	15
SMART ATA Drives	16
Hard Drive Capacities	16
5 Identifying the Chassis, Routine Care, and Disassembly Preparation	17
Electrostatic Discharge Information	17

Generating Static	17
Preventing Electrostatic Damage to Equipment	18
Personal Grounding Methods and Equipment	18
Grounding the Work Area	19
Recommended Materials and Equipment	19
Operating Guidelines	20
Routine Care	21
General Cleaning Safety Precautions	21
Cleaning the Computer Case	21
Cleaning the Keyboard	21
Cleaning the Monitor	22
Cleaning the Mouse	22
Service Considerations	22
Power Supply Fan	22
Tools and Software Requirements	22
Screws	23
Cables and Connectors	23
Hard Drives	23
Lithium Coin Cell Battery	24
6 Removal and Replacement Procedures Microtower (MT) Chassis	25
Preparation for Disassembly	25
Access Panel	26
Front Bezel	27
Bezel Blanks	28
Memory	29
DDR3-SDRAM DIMMs	29
Populating DIMM Sockets	30
Installing Memory Modules	31
Expansion Cards	33
Cable Management	37
Cable Connections	38
Drives	39
Drive Positions	39
Installing Additional Drives	40
System Board Drive Connections	41
Removing an Optical Drive	42
Installing an Optical Drive into the 5.25-inch Drive Bay	43
Removing an External 3.5-inch Drive	44
Installing a Drive into the 3.5-inch External Drive Bay	45
Removing an Internal 3.5-inch Hard Drive	46
Installing an Internal 3.5-inch Hard Drive	50
Front I/O and USB Panel Housing Assembly	53

Power Switch/LED Assembly	54
System Fan	55
Heat sink assembly	56
Processor	57
Power Supply	58
System Board	60
Battery	61
Type 1 Battery Holder	62
Type 2 Battery Holder	62
Type 3 Battery Holder	63
Installing a Security Lock	64
HP/Kensington MicroSaver Security Cable Lock	64
Padlock	64
HP Business PC Security Lock	65
Hood Sensor	67
HP Chassis Security Kit	68
Appendix A Connector Pin Assignments	69
Ethernet BNC	69
USB	69
Microphone	69
Headphone	70
Line-in Audio	70
Line-out Audio	70
4-Pin Power (for CPU)	70
Monitor	71
Serial Interface, Powered and Non-Powered	71
DVI Connector	72
24-Pin Power	72
PCI Express	73
PCI Express	74
Appendix B Power Cord Set Requirements	75
General Requirements	75
Japanese Power Cord Requirements	75
Country-Specific Requirements	76
Appendix C Troubleshooting Without Diagnostics	77
Safety and Comfort	77
Before You Call for Technical Support	77
Helpful Hints	78
Solving General Problems	80
Solving Power Problems	83

Solving Hard Drive Problems	84
Solving Media Card Reader Problems	85
Solving Display Problems	87
Solving Audio Problems	91
Solving Printer Problems	92
Solving Keyboard and Mouse Problems	94
Solving Hardware Installation Problems	96
Solving Network Problems	98
Solving Memory Problems	101
Solving CD-ROM and DVD Problems	102
Solving USB Flash Drive Problems	104
Solving Front Panel Component Problems	105
Solving Internet Access Problems	106
Solving Software Problems	108
Interpreting Power LED and Beep Codes	109
Resetting the Password Jumper	110
Resetting the CMOS Jumper	111
Contacting Customer Support	112
Appendix D Specifications	113
Index	115

1 Product Features

Standard Configuration Features

HP Pro Business PC features may vary depending on the model. For a complete listing of the hardware and software installed in the computer, run the diagnostic utility (included on some computer models only). Instructions for using the utility are provided in the *Troubleshooting Guide*.

Figure 1-1 HP Pro 2000



Figure 1-2 HP Pro 2080



 **NOTE:** The drive configuration shown above may be different than your computer model.

Serviceability Features

The Microtower computer includes features that make it easy to upgrade and service. A Torx T-15 or flat blade screwdriver is needed for many of the installation procedures described in this guide.

Front Panel Components

Drive configuration may vary by model.

Figure 1-3 Front Panel Components

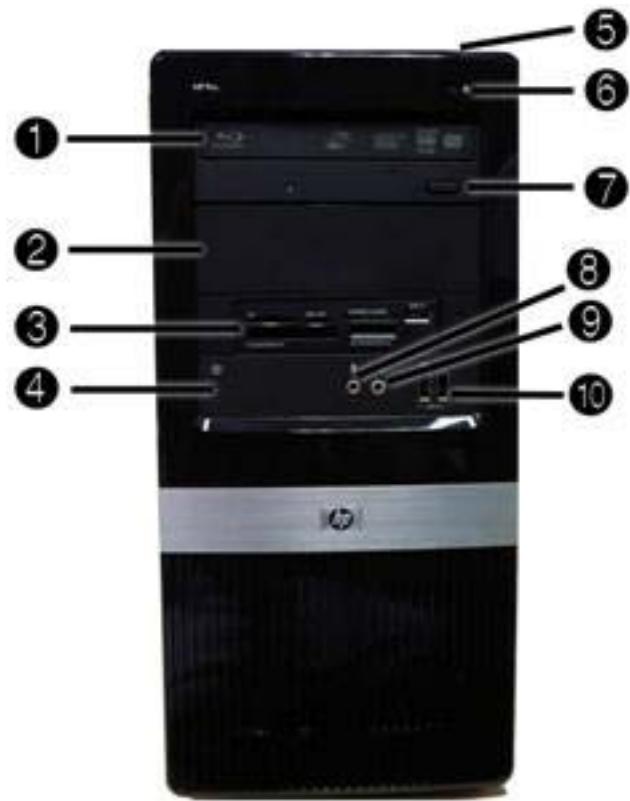


Table 1-1 Front Panel Components

1	5.25-inch Optical Drive ¹	6	Hard Drive Activity Light
2	5.25-inch Optical Drive Bay	7	Optical Drive Eject Button
3	3.5-inch Media Card Reader (optional) ²	8	Microphone Connector
4	Recovery/Reset Button	9	Headphone Connector
5	Dual-State Power Button	10	USB (Universal Serial Bus) 2.0 Ports

¹ Some models have bezel blanks covering one or both of the 5.25-inch drive bays.

² Some models have a bezel blank covering the 3.5-inch drive bay.

Media Card Reader Components

The media card reader is an optional device available on some models only. Refer to the following illustration and table to identify the media card reader components.

Figure 1-4 Media Card Reader Components

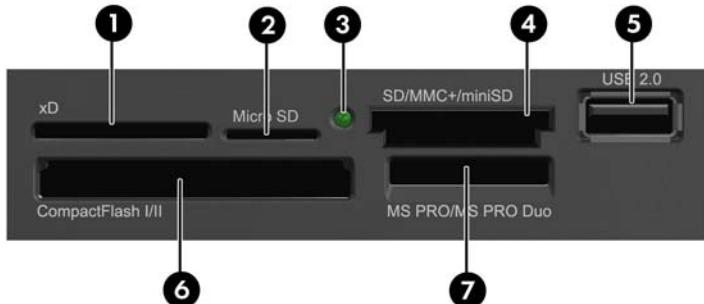


Table 1-2 Media Card Reader Components

No.	Slot	Media
1	xD	<ul style="list-style-type: none">● xD-Picture Card (xD)
2	MicroSD	<ul style="list-style-type: none">● MicroSD (T-Flash)● MicroSDHC
3	Media Card Reader Activity Light	
4	SD/MMC+/miniSD	<ul style="list-style-type: none">● Secure Digital (SD)● Secure Digital High Capacity (SDHC)● MiniSD● MiniSDHC● MultiMediaCard (MMC)● Reduced Size MultiMediaCard (RS MMC)● MultiMediaCard 4.0 (MMC Plus)● Reduced Size MultiMediaCard 4.0 (MMC Mobile)● MMC Micro (adapter required)
5	USB	<ul style="list-style-type: none">● USB (Universal Serial Bus) Port
6	CompactFlash I/II	<ul style="list-style-type: none">● CompactFlash Card Type 1● CompactFlash Card Type 2● MicroDrive
7	MS PRO/MS PRO DUO	<ul style="list-style-type: none">● Memory Stick (MS)● Memory Stick Select● MagicGate Memory Stick (MG)● Memory Stick Duo (MS Duo)● MagicGate Memory Duo● Memory Stick PRO (MS PRO)● Memory Stick PRO Duo (MS PRO Duo)● Memory Stick PRO-HG Duo● Memory Stick Micro (M2) (adapter required)

Rear Panel Components

Figure 1-5 Rear Panel Components

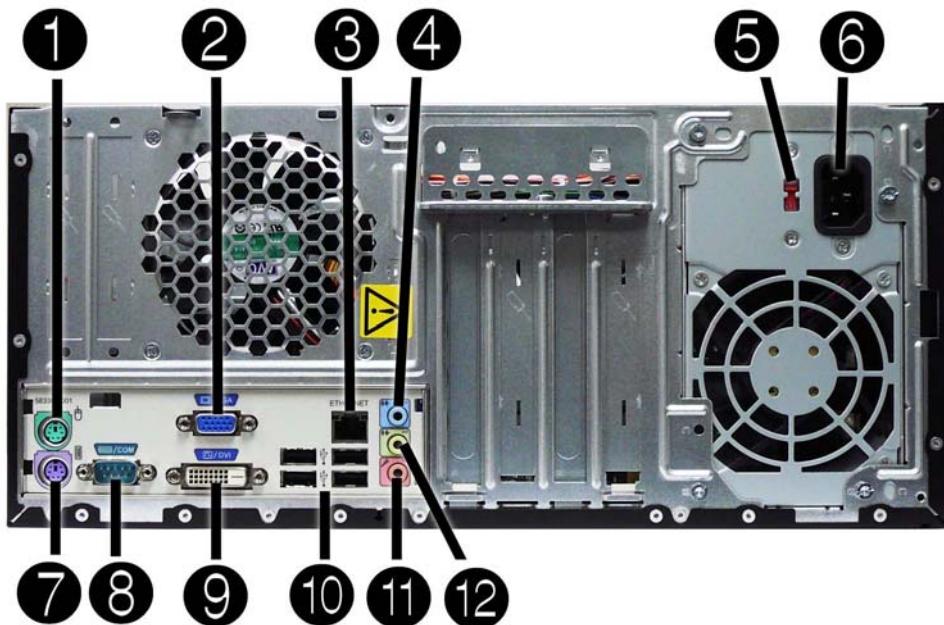


Table 1-3 Rear Panel Components

1	Mouse PS/2 connector	7	Keyboard PS/2 connector
2	VGA Monitor Connector	8	Serial connector
3	RJ-45 Network Connector	9	DVI Connector
4	Line-In Audio Connector (blue)	10	Universal Serial Bus (USB) Ports
5	Voltage Switch	11	Microphone Connector (pink)
6	Power Cord Connector	12	Line-Out Connector for powered audio devices (green)

NOTE: Arrangement and number of connectors may vary by model.

When a device is plugged into the blue Line-In Audio Connector, a dialog box will pop up asking if you want to use the connector for a line-in device or a microphone. You can reconfigure the connector at any time by double-clicking the Realtek HD Audio Manager icon in the Windows taskbar.

2 Installing and Customizing the Software

If your computer was not shipped with a Microsoft operating system, some portions of this documentation do not apply. Additional information is available in online help after you install the operating system.

-  **NOTE:** If the computer was shipped with Windows Vista or Windows 7 loaded, you will be prompted to register the computer with HP Total Care before installing the operating system. You will see a brief movie followed by an online registration form. Fill out the form, click the **Begin** button, and follow the instructions on the screen.
-  **CAUTION:** Do not add optional hardware or third-party devices to the computer until the operating system is successfully installed. Doing so may cause errors and prevent the operating system from installing properly.
-  **NOTE:** Be sure there is a 10.2-cm (4-inch) clearance at the back of the unit and above the monitor to permit the required airflow.

Installing the Operating System

The first time you turn on the computer, the operating system is installed automatically. This process takes about 5 to 10 minutes, depending on which operating system is being installed. Carefully read and follow the instructions on the screen to complete the installation.

-  **CAUTION:** Once the automatic installation has begun, DO NOT TURN OFF THE COMPUTER UNTIL THE PROCESS IS COMPLETE. Turning off the computer during the installation process may damage the software that runs the computer or prevent its proper installation.
-  **NOTE:** If the computer shipped with more than one operating system language on the hard drive, the installation process could take up to 60 minutes.

If your computer was not shipped with a Microsoft operating system, some portions of this documentation do not apply. Additional information is available in online help after you install the operating system.

Downloading Microsoft Windows Updates

1. To set up your Internet connection, click **Start > Internet Explorer** and follow the instructions on the screen.
2. Once an Internet connection has been established, click the **Start** button.
3. Select the **All Programs** menu.

4. Click on the **Windows Update** link.

In Windows Vista and Windows 7, the **Windows Update** screen appears. Click **view available updates** and make sure all critical updates are selected. Click the **Install** button and follow the instructions on the screen.

In Windows XP, you will be directed to the **Microsoft Windows Update Web site**. If you see one or more pop-up windows that ask you to install a program from <http://www.microsoft.com>, click **Yes** to install the program. Follow the instructions on the Microsoft Web site to scan for updates and install critical updates and service packs.

It is recommended that you install all of the critical updates and service packs.

5. After the updates have been installed, Windows will prompt you to reboot the machine. Be sure to save any files or documents that you may have open before rebooting. Then select **Yes** to reboot the machine.

Installing or Upgrading Device Drivers (Windows systems)

When installing optional hardware devices after the operating system installation is complete, you must also install the drivers for each of the devices.

If prompted for the i386 directory, replace the path specification with C:\i386, or use the **Browse** button in the dialog box to locate the i386 folder. This action points the operating system to the appropriate drivers.

Obtain the latest support software, including support software for the operating system from <http://www.hp.com/support>. Select your country and language, select **Download drivers and software (and firmware)**, enter the model number of the computer, and press **Enter**.

Accessing Disk Image (ISO) Files

There are disk image files (ISO files) included on your PC that contain the installation software for additional software. These CD image files are located in the folder C:\SWSetup\ISOs. Each .iso file can be burned to CD media to create an installation CD. It is recommended that these disks be created and the software installed in order to get the most from your PC. The software and image file names are:

- Corel WinDVD SD and BD – installation software for WinDVD – used to play DVD movies
- HP Insight Diagnostics OR Vision Diagnostics – software to perform diagnostic activities on your PC

Protecting the Software

To protect the software from loss or damage, keep a backup copy of all system software, applications, and related files stored on the hard drive. Refer to the operating system or backup utility documentation for instructions on making backup copies of your data files.

3 Computer Setup (F10) Utility

Computer Setup (F10) Utilities

Use Computer Setup (F10) Utility to do the following:

- Change factory default settings.
- Set the system date and time.
- Set, view, change, or verify the system configuration, including settings for processor, graphics, memory, audio, storage, communications, and input devices.
- Modify the boot order of bootable devices such as hard drives, diskette drives, optical drives, or USB flash media devices.
- Restrict a device from booting the unit.
- Run hard drive self-tests.
- View CPU and system temperatures.
- Establish a supervisor password that controls access to Computer Setup (F10) Utility and the settings described in this section.
- Secure integrated I/O functionality, including the serial, USB, or parallel ports, audio, or embedded NIC, so that they cannot be used until they are unsecured.
- Enable or disable pre-boot messages.
- Enable or disable USB legacy support.

Using Computer Setup (F10) Utilities

Computer Setup can be accessed only by turning the computer on or restarting the system. To access the Computer Setup Utilities menu, complete the following steps:

1. Turn on or restart the computer.
 2. As soon as the computer is turned on, press **F10** before the system boots to the operating system to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.
-
-  **NOTE:** If you do not press **F10** at the appropriate time, you must restart the computer and again press **F10** before the unit boots to the operating system to access the utility.
3. The Computer Setup Utility screen is divided into menu headings and actions.

Six menu headings appear on the Computer Setup Utility screen:

- Main
- Advanced
- Boot
- Power
- PC Health
- Exit

Use the arrow keys to select the appropriate heading, then press **Enter**. Use the arrow (up and down) keys to select the option you want, then press **Enter**. To return to the previous screen, press **Esc**.

4. To apply and save changes, press the **F10** key.

If you have made changes that you do not want applied, press the **F5** key to return to the previous values.

To load optimized default values, press the **F7** key.

△ **CAUTION:** Do NOT turn the computer power OFF while the ROM is saving the Computer Setup (F10) changes because the CMOS could become corrupted. It is safe to turn off the computer only after exiting the F10 Setup screen.

Table 3-1 Computer Setup (F10) Utility Main Menu

Heading	Table
Main	Computer Setup—Main on page 10
Advanced	Computer Setup—Advanced on page 11
Boot	Computer Setup—Boot on page 12
Power	Computer Setup—Power on page 13
PC Health	Computer Setup—PC Health on page 13
Exit	Computer Setup—Exit on page 14

Computer Setup—Main

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 3-2 Computer Setup—Main

Option	Description
System Information	Allows you to view the following system information: <ul style="list-style-type: none">• Product Name (view only)• SKU Number (view only)• Processor Type (view only)• Processor Speed (view only)• CPUID/PatchID (view only)• Cache Size (view only)• Memory Size (view only)• Integrated MAC (view only)• System BIOS (view only)• Chassis Serial Number (view only)• Asset Tag Number (press Enter to change)• UUID (view only)
Set Time and Date	Allows you to set system time and date.
SATA Port 1	Allows or displays the following for each SATA Port:
SATA Port 2	<ul style="list-style-type: none">• Port Configuration — Disable/enable SATA Port
SATA Port 3	<ul style="list-style-type: none">• HDD Self-Test for selected channel:
SATA Port 4	<ul style="list-style-type: none">◦ SMART Status Check◦ HDD Short Self-Test◦ HDD Extended Self-Test <ul style="list-style-type: none">• Vendor (view only)• Size (view only)• Firmware (view only)
SATA Controller	Allows you to choose how the SATA controller and devices are accessed by the operating system. The following options are available: <ul style="list-style-type: none">• Native Mode - 4 SATA ports• Compatible Mode - 2 PATA devices and 2 SATA devices (ports)
Onboard FDC Controller	Disables/enables the floppy disk controller.
Drive A	(view only)

Table 3-2 Computer Setup—Main (continued)

Option	Description
Halt On	Allows you to set POST error behavior to: <ul style="list-style-type: none">• No Errors• All Errors• All But Keyboard
POST Delay	Allows you to set a POST delay to: <ul style="list-style-type: none">• 0 seconds• 5 seconds• 10 seconds• 15 seconds• 30 seconds

Computer Setup—Advanced

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 3-3 Computer Setup—Advanced

Option	Description
Execute Disable Bit	Disables/enables hardware DEP function.
Intel® Virtualization Tech	Disables/enables Intel's Virtualization Technology feature.
Init Display First	Allows you to select the primary display device: <ul style="list-style-type: none">• OnChip VGA• PCI Slot• PCIEx
MAX DVMT Allocation	Allows you to specify the DVMT/system memory allocated for video memory.: <ul style="list-style-type: none">• 128MB• 256MB• Max
Onboard HD Audio	Allows you to disable/enable onboard audio controller.
OnChip USB Controller	Disables/enables the universal host controller interface for USB (Universal Serial Bus).
USB Legacy Support	Disables/enables USB legacy support function (USB keyboard, USB mouse, and USB flash media).
Onboard LAN	Disables/enables onboard LAN controller.

Table 3-3 Computer Setup—Advanced (continued)

Option	Description
Onboard LAN Boot ROM	Disables/enables the boot ROM of the onboard LAN chip.
Onboard Serial Port 1	Allows you to select a setting for the onboard serial port: <ul style="list-style-type: none">● Disabled● 3F8/IRQ4● 2F8/IRQ3● 3E8/IRQ4● 2E8/IRQ3

Computer Setup—Boot

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 3-4 Computer Setup—Boot

Option	Description
F9 Boot Menu	Disables/enables F9 Boot Menu.
F10 Setup Prompt	Disables/enables the F10 Setup prompt message on the logo screen.
F11 Recovery	Disables/enables F11 Recovery and provides the option of showing the F11 Recovery prompt message on the logo screen. Choose from the following: <ul style="list-style-type: none">● Disabled● Enabled no prompt● Enabled and prompt
F12 Boot from LAN Prompt	Disables/enables the F12 Boot from LAN prompt message on the logo screen.
Hard Disk Boot Seq.	Allows you to specify the order of attached hard drive devices (such as USB HDD storage or USB flash media). The first drive in the order has priority in the boot sequence and is recognized as drive C (if any devices are attached).
Optical Drive Boot Seq.	Allows you to specify the order in which attached optical drives (including USB ODD) are checked for a bootable operating system image.
Network Boot Seq.	Allows you to specify the order in which network devices (including UP NIC cards) are checked for a bootable operating system image.
First Boot Device	Allows you to specify which devices will boot first, second, third, and fourth or to disable any of the four:
Second Boot Device	
Third Boot Device	
Fourth Boot Device	
	NOTE: MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started.

Table 3-4 Computer Setup—Boot (continued)

Option	Description
Set Supervisor Password	Allows you to establish a password to control access to Computer Setup.
BIOS Write Protection	Disables/enables BIOS upgrading.

Computer Setup—Power

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 3-5 Computer Setup—Power

Option	Description
After AC Power Loss	Allows you to select system power loss behavior: <ul style="list-style-type: none">• Off• On• Last State
Wake on PCI Device from S5	Disables/enables waking up from S5 by PCI device.
RTC Alarm Resume	Disables/enables RTC (real-time clock) alarm.

Computer Setup—PC Health

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 3-6 Computer Setup—PC Health

Option	Description
Chassis Opened Warning	Allows you to disable/enable the chassis intrusion function and clear the intrusion warning. <ul style="list-style-type: none">• Disabled• Enabled• Clear
System Fan Fail Check	Disables/enables detection of system fan during POST.
Smart Fan Function	Disables/enables Smart Fan functionality. Enabling optimizes fan control for best acoustic behavior.
Current CPU Temperature	(view only)
Current System Temperature	(view only)

Table 3-6 Computer Setup—PC Health (continued)

Option	Description
Current CPU Fan Speed	(view only)
Current System Fan Speed	(view only)

Computer Setup—Exit

Table 3-7 Computer Setup—Exit

Option	Description
Save Changes and Exit	Allows you to save current settings and exit Computer Setup.
Discard Changes and Exit	Allows you to exit Computer Setup without saving changes.
Load Optimal Defaults	Allows you to reset Computer Setup to factory defaults.

4 Serial ATA (SATA) Drive Guidelines and Features



NOTE: HP only supports the use of SATA hard drives on these models of computer. No Parallel ATA (PATA) drives are supported.

SATA Hard Drives

Serial ATA Hard Drive Characteristics

Number of pins/conductors in data cable	7/7
Number of pins in power cable	15
Maximum data cable length	39.37 in (100 cm)
Data interface voltage differential	400-700 mV
Drive voltages	3.3 V, 5 V, 12 V
Jumpers for configuring drive	N/A
Data transfer rate	3.0 Gb/s

SATA Hard Drive Cables

SATA Data Cable

Always use an HP approved SATA 3.0 Gb/s cable as it is fully backwards compatible with the SATA 1.5 Gb/s drives.

Current HP desktop products ship with SATA 3.0 Gb/s hard drives.

SATA data cables are susceptible to damage if overflexed. Never crease a SATA data cable and never bend it tighter than a 30 mm (1.18 in) radius.

The SATA data cable is a thin, 7-pin cable designed to transmit data for only a single drive.

SMART ATA Drives

The Self Monitoring Analysis and Recording Technology (SMART) ATA drives for the HP Personal Computers have built-in drive failure prediction that warns the user or network administrator of an impending failure or crash of the hard drive. The SMART drive tracks fault prediction and failure indication parameters such as reallocated sector count, spin retry count, and calibration retry count. If the drive determines that a failure is imminent, it generates a fault alert.

Hard Drive Capacities

The combination of the file system and the operating system used in the computer determines the maximum usable size of a drive partition. A drive partition is the largest segment of a drive that may be properly accessed by the operating system. A single hard drive may therefore be subdivided into a number of unique drive partitions in order to make use of all of its space.

Because of the differences in the way that drive sizes are calculated, the size reported by the operating system may differ from that marked on the hard drive or listed in the computer specification. Drive size calculations by drive manufacturers are bytes to the base 10 while calculations by Microsoft are bytes to the base 2.

Drive/Partition Capacity Limits				
File System	Controller Type	Operating System	Partition	Drive
FAT 32	ATA	Windows XP/Windows Vista/Windows 7	32 GB	2 TB
NTFS	ATA	Windows XP/Windows Vista/Windows 7	2 TB	2 TB

5 Identifying the Chassis, Routine Care, and Disassembly Preparation

This chapter provides general service information for the computer. Adherence to the procedures and precautions described in this chapter is essential for proper service.

- △ **CAUTION:** When the computer is plugged into an AC power source, voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

Electrostatic Discharge Information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) may not appear to be affected at all and can work perfectly throughout a normal cycle. The device may function normally for a while, but it has been degraded in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

Generating Static

The following table shows that:

- Different activities generate different amounts of static electricity.
- Static electricity increases as humidity decreases.

Event	Relative Humidity		
	55%	40%	10%
Walking across carpet	7,500 V	15,000 V	35,000 V
Walking across vinyl floor	3,000 V	5,000 V	12,000 V
Motions of bench worker	400 V	800 V	6,000 V
Removing DIPs* from plastic tube	400 V	700 V	2,000 V

Removing DIPs* from vinyl tray	2,000 V	4,000 V	11,500 V
Removing DIPs* from Styrofoam	3,500 V	5,000 V	14,500 V
Removing bubble pack from PCB	7,000 V	20,000 V	26,500 V
Packing PCBs in foam-lined box	5,000 V	11,000 V	21,000 V

*These are then multi-packaged inside plastic tubes, trays, or Styrofoam.



NOTE: 700 volts can degrade a product.

Preventing Electrostatic Damage to Equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following packaging and grounding precautions are necessary to prevent damage to electric components and accessories.

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.
- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.
- Keep electrostatic sensitive parts in their containers until they arrive at static-free stations.
- Place items on a grounded surface before removing them from their container.
- Always be properly grounded when touching a sensitive component or assembly.
- Avoid contact with pins, leads, or circuitry.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

Personal Grounding Methods and Equipment

Use the following equipment to prevent static electricity damage to equipment:

- Wrist straps** are flexible straps with a maximum of one-megohm \pm 10% resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.
- Heel straps/Toe straps/Boot straps** can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a maximum of one-megohm \pm 10% resistance between the operator and ground.

Static Shielding Protection Levels	
Method	Voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

Grounding the Work Area

To prevent static damage at the work area, use the following precautions:

- Cover the work surface with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Use static-dissipative mats, foot straps, or air ionizers to give added protection.
- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.
- Turn off power and input signals before inserting and removing connectors or test equipment.
- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.
- Keep work area free of nonconductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

Recommended Materials and Equipment

Materials and equipment that are recommended for use in preventing static electricity include:

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of one-megohm +/- 10% resistance
- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing one-megohm +/- 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

Operating Guidelines

To prevent overheating and to help prolong the life of the computer:

- Keep the computer away from excessive moisture, direct sunlight, and extremes of heat and cold.
- Operate the computer on a sturdy, level surface. Leave a 10.2-cm (4-inch) clearance on all vented sides of the computer and above the monitor to permit the required airflow.
- Never restrict the airflow into the computer by blocking any vents or air intakes. Do not place the keyboard, with the keyboard feet down, directly against the front of the desktop unit as this also restricts airflow.
- Occasionally clean the air vents on all vented sides of the computer. Lint, dust, and other foreign matter can block the vents and limit the airflow. Be sure to unplug the computer before cleaning the air vents.
- Never operate the computer with the cover or side panel removed.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.
- Keep liquids away from the computer and keyboard.
- Never cover the ventilation slots on the monitor with any type of material.
- Install or enable power management functions of the operating system or other software, including sleep states.

Routine Care

General Cleaning Safety Precautions

1. Never use solvents or flammable solutions to clean the computer.
2. Never immerse any parts in water or cleaning solutions; apply any liquids to a clean cloth and then use the cloth on the component.
3. Always unplug the computer when cleaning with liquids or damp cloths.
4. Always unplug the computer before cleaning the keyboard, mouse, or air vents.
5. Disconnect the keyboard before cleaning it.
6. Wear safety glasses equipped with side shields when cleaning the keyboard.

Cleaning the Computer Case

Follow all safety precautions in [General Cleaning Safety Precautions on page 21](#) before cleaning the computer.

To clean the computer case, follow the procedures described below:

- To remove light stains or dirt, use plain water with a clean, lint-free cloth or swab.
- For stronger stains, use a mild dishwashing liquid diluted with water. Rinse well by wiping it with a cloth or swab dampened with clear water.
- For stubborn stains, use isopropyl (rubbing) alcohol. No rinsing is needed as the alcohol will evaporate quickly and not leave a residue.
- After cleaning, always wipe the unit with a clean, lint-free cloth.
- Occasionally clean the air vents on the computer. Lint and other foreign matter can block the vents and limit the airflow.

Cleaning the Keyboard

Follow all safety precautions in [General Cleaning Safety Precautions on page 21](#) before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in [Cleaning the Computer Case on page 21](#).

When cleaning debris from under the keys, review all rules in [General Cleaning Safety Precautions on page 21](#) before following these procedures:

△ **CAUTION:** Use safety glasses equipped with side shields before attempting to clean debris from under the keys.

- Visible debris underneath or between the keys may be removed by vacuuming or shaking.
- Canned, pressurized air may be used to clean debris from under the keys. Caution should be used as too much air pressure can dislodge lubricants applied under the wide keys.

- If you remove a key, use a specially designed key puller to prevent damage to the keys. This tool is available through many electronic supply outlets.
-
- △ **CAUTION:** Never remove a wide leveled key (like the space bar) from the keyboard. If these keys are improperly removed or installed, the keyboard may not function properly.
- Cleaning under a key may be done with a swab moistened with isopropyl alcohol and squeezed out. Be careful not to wipe away lubricants necessary for proper key functions. Use tweezers to remove any fibers or dirt in confined areas. Allow the parts to air dry before reassembly.

Cleaning the Monitor

- Wipe the monitor screen with a clean cloth moistened with water or with a towelette designed for cleaning monitors. Do not use sprays or aerosols directly on the screen; the liquid may seep into the housing and damage a component. Never use solvents or flammable liquids on the monitor.
- To clean the monitor body follow the procedures in [Cleaning the Computer Case on page 21](#).

Cleaning the Mouse

Before cleaning the mouse, ensure that the power to the computer is turned off.

- Clean the mouse ball by first removing the retaining plate and the ball from the housing. Pull out any debris from the ball socket and wipe the ball with a clean, dry cloth before reassembly.
- To clean the mouse body, follow the procedures in [Cleaning the Computer Case on page 21](#).

Service Considerations

Listed below are some of the considerations that you should keep in mind during the disassembly and assembly of the computer.

Power Supply Fan

The power supply fan is a variable-speed fan based on the temperature in the power supply.

△ **CAUTION:** The cooling fan is always on when the computer is in the “On” mode. The cooling fan is off when the computer is in “Standby,” “Suspend,” or “Off” modes.

You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

Tools and Software Requirements

To service the computer, you need the following:

- Torx T-15 screwdriver (HP screwdriver with bits, PN 161946-001)
- Torx T-15 screwdriver with small diameter shank (for certain front bezel removal)
- Flat-bladed screwdriver (may sometimes be used in place of the Torx screwdriver)
- Phillips #2 screwdriver

- Diagnostics software
- HP tamper-resistant T-15 wrench (Smart Cover FailSafe Key, PN 166527-001) or HP tamper-resistant bits (Smart Cover FailSafe Key, PN 166527-002)

Screws

The screws used in the computer are not interchangeable. They may have standard or metric threads and may be of different lengths. If an incorrect screw is used during the reassembly process, it can damage the unit. HP strongly recommends that all screws removed during disassembly be kept with the part that was removed, then returned to their proper locations.

△ **CAUTION:** Metric screws have a black finish. U.S. screws have a silver finish and are used on hard drives only.

CAUTION: As each subassembly is removed from the computer, it should be placed away from the work area to prevent damage.

Cables and Connectors

Most cables used throughout the unit are flat, flexible cables. These cables must be handled with care to avoid damage. Apply only the tension required to seat or unseat the cables during insertion or removal from the connector. Handle cables by the connector whenever possible. In all cases, avoid bending or twisting the cables, and ensure that the cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced.

△ **CAUTION:** When servicing this computer, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the computer.

Hard Drives

Handle hard drives as delicate, precision components, avoiding all physical shock and vibration. This applies to failed drives as well as replacement spares.

- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package "Fragile: Handle With Care."
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the computer. Do not remove a hard drive while the computer is on or in standby mode.
- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to [Electrostatic Discharge Information on page 17](#)
- Do not use excessive force when inserting a drive.
- Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields such as monitors or speakers.

Lithium Coin Cell Battery

The battery that comes with the computer provides power to the real-time clock and has a minimum lifetime of about three years.

See the appropriate removal and replacement chapter for the chassis you are working on in this guide for instructions on the replacement procedures.

 **WARNING!** This computer contains a lithium battery. There is a risk of fire and chemical burn if the battery is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose it to temperatures higher than 140°F (60°C). Do not attempt to recharge the battery.

 **NOTE:** Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, their authorized partners, or their agents.

6 Removal and Replacement Procedures

Microtower (MT) Chassis

Adherence to the procedures and precautions described in this chapter is essential for proper service. After completing all necessary removal and replacement procedures, run the Diagnostics utility to verify that all components operate properly.

 **NOTE:** Not all features listed in this guide are available on all computers.

Preparation for Disassembly

1. Close any open software applications.
2. Exit the operating system.
3. Remove any diskette or compact disc from the computer.
4. Turn off the computer and any peripheral devices that are connected to it.

 **CAUTION:** Turn off the computer before disconnecting any cables.

CAUTION: Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. In some systems the cooling fan is on even when the computer is in the "Standby," or "Suspend" modes. The power cord should always be disconnected before servicing a unit.

5. Disconnect the power cord from the electrical outlet and then from the computer.
6. Disconnect all peripheral device cables from the computer.

 **NOTE:** During disassembly, label each cable as you remove it, noting its position and routing. Keep all screws with the units removed.

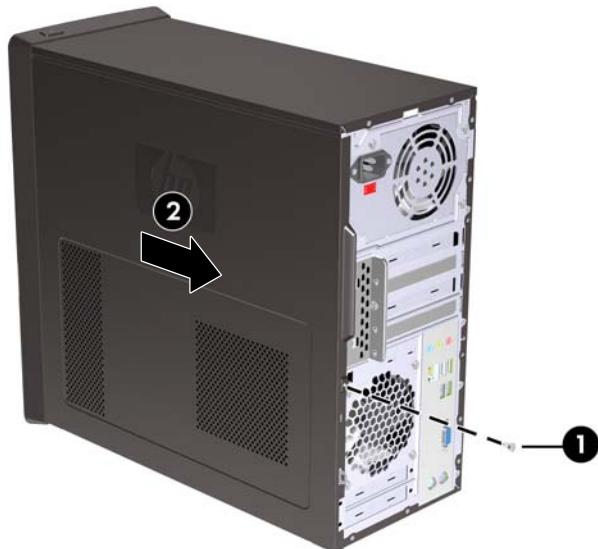
 **CAUTION:** The screws used in the computer are of different thread sizes and lengths; using the wrong screw in an application may damage the unit.

Access Panel

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Loosen the screw (1) that secures the access panel to the computer chassis.
3. Slide the access panel back (2) about 1.3 cm (1/2 inch), then lift it off the unit.

 **NOTE:** You may want to lay the computer on its side to install internal parts. Be sure the side with the access panel is facing up.

Figure 6-1 Removing the Computer Access Panel

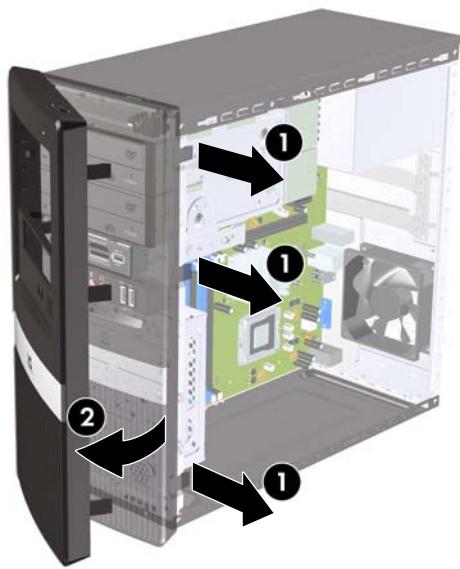


To replace the access panel, reverse the removal steps.

Front Bezel

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Press outward on the three latches on the right side of the bezel (1), then rotate the right side of the bezel off the chassis (2) followed by the left side.

Figure 6-2 Removing the Front Bezel



NOTE: The appearance of the front bezel may vary.

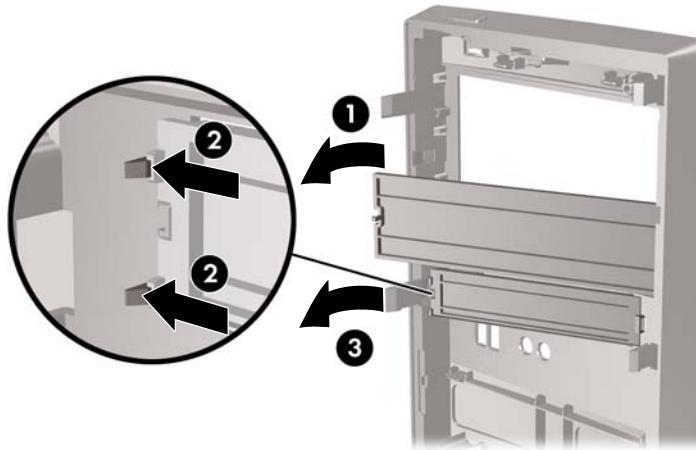
To reinstall the front bezel, reverse the removal procedure.

Bezel Blanks

On some models, there are bezel blanks covering the 3.5-inch and 5.25-inch external drive bays that need to be removed before installing a drive. To remove a bezel blank:

1. Remove the front bezel ([Front Bezel on page 27](#)).
2. To remove the lower 5.25-inch bezel blank, gently twist and pull on the bezel blank until it breaks free from the front bezel (1), then discard the bezel blank. If the blank needs to be replaced at a later date, you can order a replacement blank from HP.
3. To remove the 3.5-inch bezel blank, press the two retaining tabs towards the outer left edge of the bezel (2) and pull the bezel blank inwards to free it from the front bezel (3).

Figure 6-3 Removing a Bezel Blank



4. Replace the front bezel.

Memory

The computer comes with double data rate 3 synchronous dynamic random access memory (DDR3-SDRAM) dual inline memory modules (DIMMs).

DDR3-SDRAM DIMMs

The memory sockets on the system board can be populated with up to four industry-standard DIMMs. These memory sockets are populated with at least one preinstalled DIMM. To achieve the maximum memory support, you can populate the system board with up to 8 GB of memory configured in a high-performing dual channel mode.

For proper system operation, the DDR3-SDRAM DIMMs must be:

- industry-standard 240-pin
- unbuffered non-ECC PC3-10600 DDR3-1333 MHz-compliant
- 1.5 volt DDR3-SDRAM DIMMs

The DDR3-SDRAM DIMMs must also:

- support CAS latency 9 DDR3 1333 MHz (9-9-9 timing)
- contain the mandatory JEDEC SPD information

In addition, the computer supports:

- 512-Mbit, 1-Gbit, and 2-Gbit non-ECC memory technologies
- single-sided and double-sided DIMMs
- DIMMs constructed with x8 and x16 DDR devices; DIMMs constructed with x4 SDRAM are not supported



NOTE: The system will not operate properly if you install unsupported DIMMs.

Populating DIMM Sockets

There are four DIMM sockets on the system board, with two sockets per channel.

Populate the DIMM sockets in the following order: DIMM1 then DIMM2

Figure 6-4 DIMM Socket Locations

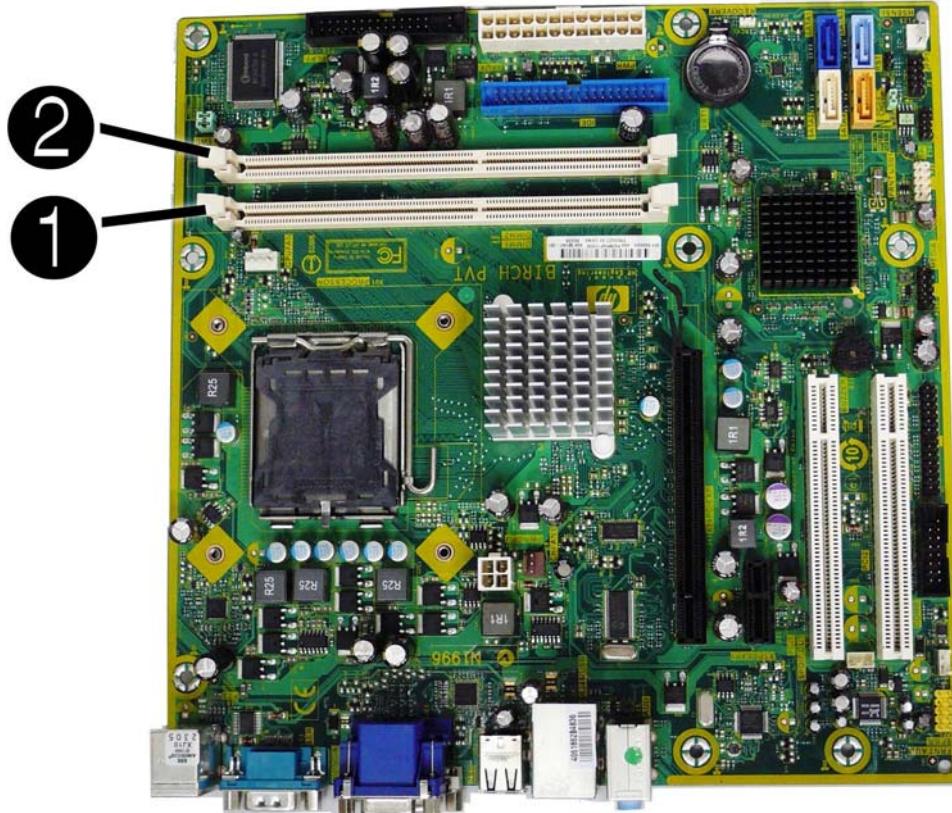


Table 6-1 DIMM Socket Locations

Item	Description	Socket Color	Insertion Order
1	DIMM1 socket, Channel A (populate first)	White	1
2	DIMM2 socket, Channel A	White	2

NOTE: A DIMM must occupy the DIMM1 socket.

The system will automatically operate in single channel mode, dual channel mode, or flex mode, depending on how the DIMMs are installed.

- The system will operate in single channel mode if the DIMM sockets are populated in one channel only.
- The system will operate in a higher-performing dual channel mode if the total memory capacity of the DIMMs in Channel A is equal to the total memory capacity of the DIMMs in Channel B. The technology and device width can vary between the channels. For example, if Channel A is populated with two 1-GB DIMMs and Channel B is populated with one 2-GB DIMM, the system will operate in dual channel mode.

- The system will operate in flex mode if the total memory capacity of the DIMMs in Channel A is not equal to the total memory capacity of the DIMMs in Channel B. In flex mode, the channel populated with the least amount of memory describes the total amount of memory assigned to dual channel and the remainder is assigned to single channel. For optimal speed, the channels should be balanced so that the largest amount of memory is spread between the two channels. If one channel will have more memory than the other, the larger amount should be assigned to Channel A. For example, if you are populating the sockets with one 2-GB DIMM, and three 1-GB DIMMs, Channel A should be populated with the 2-GB DIMM and one 1-GB DIMM, and Channel B should be populated with the two 1-GB DIMMs. With this configuration, 4 GB will run as dual channel and 1 GB will run as single channel.
- In any mode, the maximum operational speed is determined by the slowest DIMM in the system.

Installing Memory Modules

 **CAUTION:** You must disconnect the power cord and wait approximately 30 seconds for the power to drain before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged into an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

The memory module sockets have gold-plated metal contacts. When upgrading the memory, it is important to use memory modules with gold-plated metal contacts to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.

Static electricity can damage the electronic components of the computer or optional cards. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

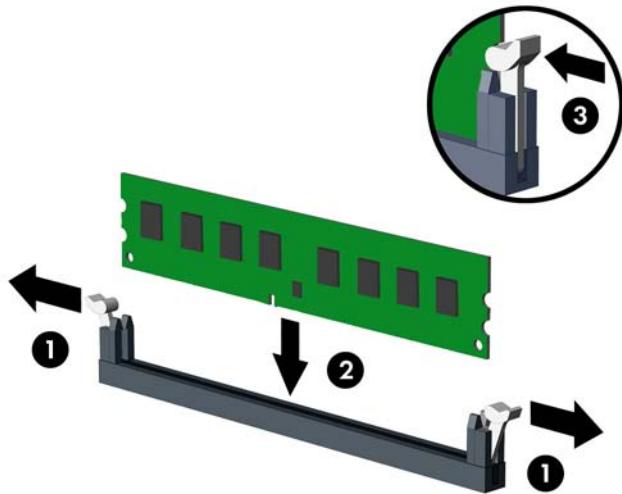
When handling a memory module, be careful not to touch any of the contacts. Doing so may damage the module.

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Locate the memory module sockets on the system board.

 **WARNING!** To reduce risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

4. Open both latches of the memory module socket (1), and insert the memory module into the socket (2).

Figure 6-5 Installing a DIMM



NOTE: A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket.

A DIMM must occupy the DIMM1 socket. Always populate the blue sockets before the black sockets in each channel.

To create a dual-channel memory configuration, the memory capacity of Channel A must equal the memory capacity of Channel B. Refer to [Populating DIMM Sockets on page 30](#) for more information.

5. Push the DIMM module down firmly into the socket, ensuring that the module is fully inserted and properly seated. The DIMM must be pushed all the way down into the socket and sit evenly in the socket to avoid memory corruption. Make sure the latches are in the closed position (3).
6. Repeat steps 4 and 5 to install any additional modules.
7. Replace the computer access panel.
8. Reconnect the power cord and any external devices, then turn on the computer. The computer should automatically recognize the additional memory when you turn on the computer.
9. Lock any security devices that were disengaged when the access panel was removed.

Expansion Cards

The HP Pro 2000/2080 has two PCI expansion slots, one PCI Express x1 expansion slot, and one PCI Express x16 expansion slot. The expansion slots accommodate full-height or half-height expansion cards.

Figure 6-6 Expansion Slot Locations

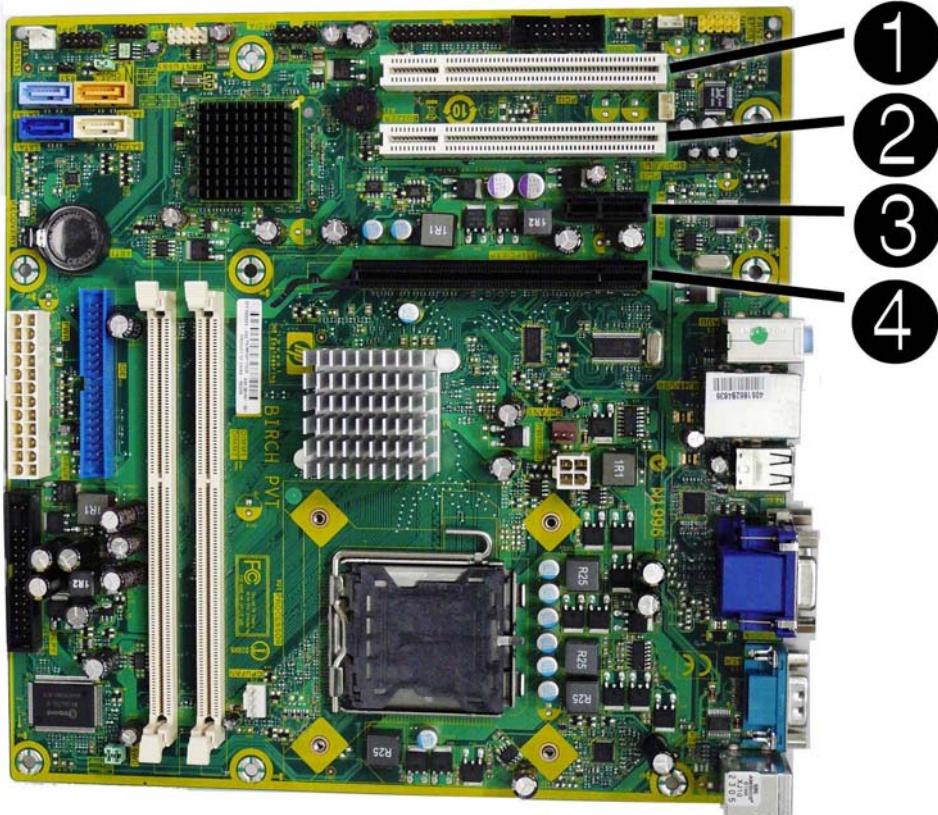


Table 6-2 Expansion Slot Locations

Item	Description
1	PCI expansion slot
2	PCI expansion slot
3	PCI Express x1 expansion slot
4	PCI Express x16 expansion slot

 **NOTE:** You can install a PCI Express x1, x4, x8, or x16 expansion card in the PCI Express x16 expansion slot.

To remove, replace, or add an expansion card:

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Locate the correct vacant expansion socket on the system board and the corresponding expansion slot on the back of the computer chassis.

4. On the rear of the computer, a slot cover lock secures the expansion card brackets in place. Remove the screw from the slot cover lock then slide the slot cover lock up to remove it from the chassis.

Figure 6-7 Opening the Slot Cover Lock

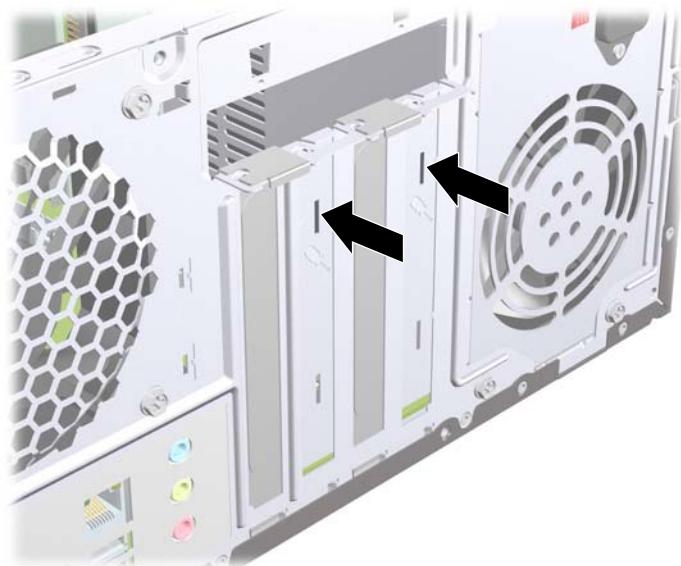


5. Before installing an expansion card, remove the expansion slot cover or the existing expansion card.

 **NOTE:** Before removing an installed expansion card, disconnect any cables that may be attached to the expansion card.

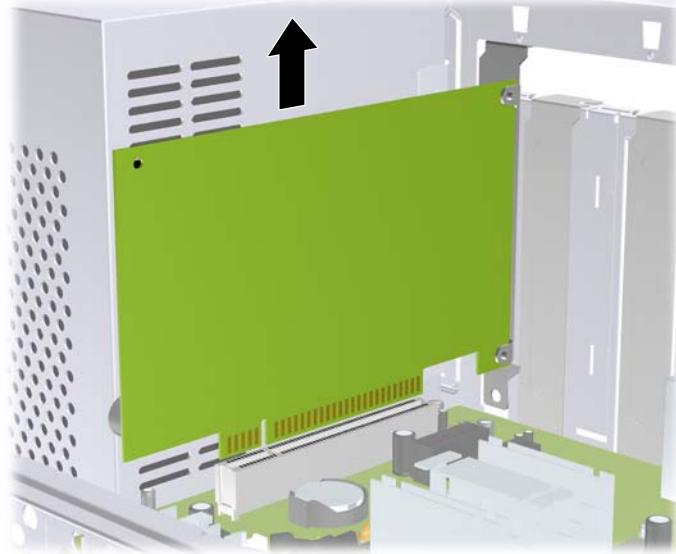
- a. If you are installing an expansion card in a vacant socket, you must use a flatblade screwdriver to pry out the metal shield on the rear panel that covers the expansion slot. Be sure to remove the appropriate shield for the expansion card you are installing.

Figure 6-8 Removing an Expansion Slot Cover



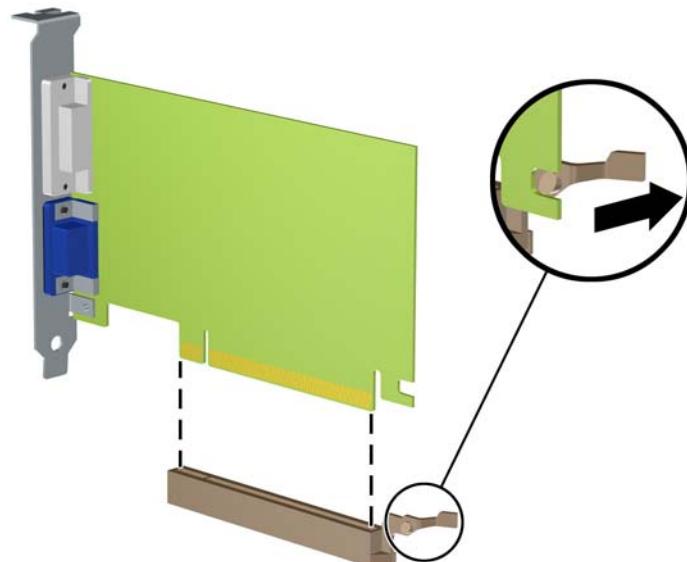
- b. If you are removing a standard PCI card or PCI Express x1 card, hold the card at each end, and carefully rock it back and forth until the connectors pull free from the socket. Pull the expansion card straight up from the socket then away from the inside of the chassis to release it from the chassis frame. Be sure not to scrape the card against the other components.

Figure 6-9 Removing a PCI or PCI Express x1 Expansion Card



- c. If you are removing a PCI Express x16 card, pull the retention arm on the back of the expansion socket away from the card and carefully rock the card back and forth until the connectors pull free from the socket. Be sure not to scrape the card against the other components.

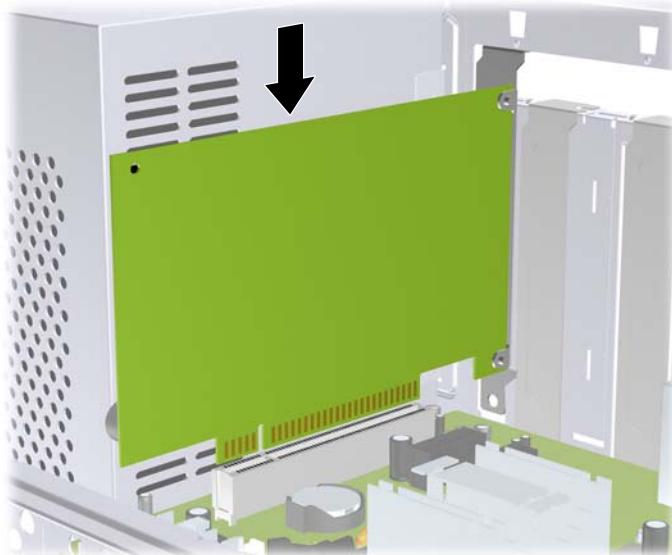
Figure 6-10 Removing a PCI Express x16 Expansion Card



6. Store the removed card in anti-static packaging.

7. If you are not installing a new expansion card, install an expansion slot cover to close the open slot.
- △ **CAUTION:** After removing an expansion card, you must replace it with a new card or expansion slot cover for proper cooling of internal components during operation.
8. To install a new expansion card, hold the card just above the expansion socket on the system board then move the card toward the rear of the chassis so that the bottom of the bracket on the card slides into the small slot on the chassis. Press the card straight down into the expansion socket on the system board.

Figure 6-11 Installing an Expansion Card



☒ **NOTE:** When installing an expansion card, press firmly on the card so that the whole connector seats properly in the expansion card slot.

9. Replace the slot cover lock and secure it in place with the screw that was previously removed.

Figure 6-12 Securing the Expansion Cards and Slot Covers



- 10.** Connect external cables to the installed card, if needed. Connect internal cables to the system board, if needed.
- 11.** Replace the computer access panel.
- 12.** Reconnect the power cord and any external devices, then turn on the computer.
- 13.** Lock any security devices that were disengaged when the access panel was removed.
- 14.** Reconfigure the computer, if necessary. Refer to the *Computer Setup (F10) Utility Guide* for instructions on using Computer Setup.

Cable Management

Always follow good cable management practices when working inside the computer.

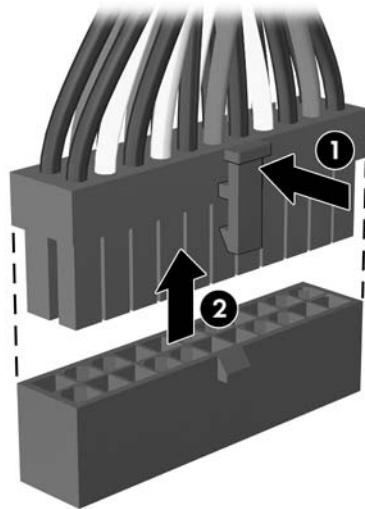
- Keep cables away from major heat sources like the heatsink.
- Do not jam cables on top of expansion cards or memory modules. Printed circuit cards like these are not designed to take excessive pressure on them.
- Some flat ribbon cables come prefolded. Never change the folds on these cables.
- Never bend a SATA data cable tighter than a 30 mm (1.18 in) radius.
- Never crease a SATA data cable.
- Do not rely on components like the drive cage, power supply, or computer cover to push cables down into the chassis. Always position the cables to lay properly by themselves.

When removing the power supply power cable from the P1 connector on the system board, always follow these steps:

- 1.** Squeeze on the top of the retaining latch attached to the cable end of the connector **(1)**.

2. Grasp the cable end of the connector and pull it straight up (2).

△ **CAUTION:** Always pull the connector - NEVER pull on the cable. Pulling on the cable could damage the cable and result in a failed power supply.



Cable Connections

System board connectors are color-coded to make it easier to find the proper connection.

Connector Name	Connector Color	Description
PWR	white	Power supply, 24-pin
PWRCPU	white	Power supply, 4-pin
CHFAN1	brown	Chassis fan
CPUFAN	white	Heat sink fan
MEDIA	black	Media card reader
SPKR	white	Speaker
JFP1	black	Power switch
FRNT AUD	yellow	Front I/O audio
FRNT USB1	white	Front I/O USB
SATA1	dark blue	Primary hard drive
SATA2	white	Primary optical drive
SATA3	light blue	Second hard drive
SATA4	orange	Second optical drive

Drives

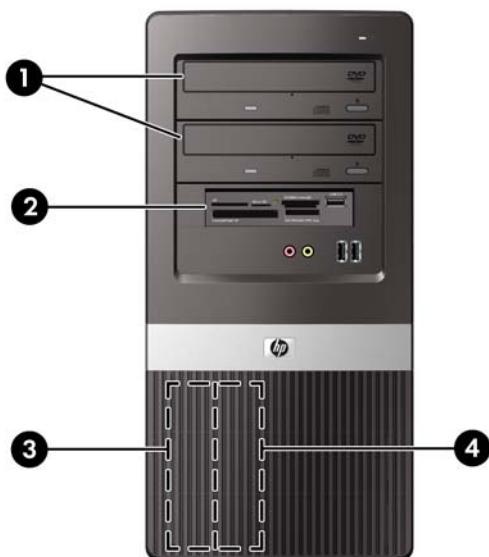
The computer supports up to five drives that may be installed in various configurations.

This section describes the procedure for replacing or upgrading the storage drives. A Torx T-15 screwdriver is needed to remove and install the guide screws on a drive.

Drive Positions

 **NOTE:** Front bezel appearance may vary.

Figure 6-13 Drive Positions



- 1 Two 5.25-inch external drive bays for optional drives (optical drives shown)
- 2 One 3.5-inch external drive bay for optional drive (media card reader shown)
- 3 Primary 3.5-inch internal hard drive bay
- 4 Secondary 3.5-inch internal hard drive bay for optional hard drive

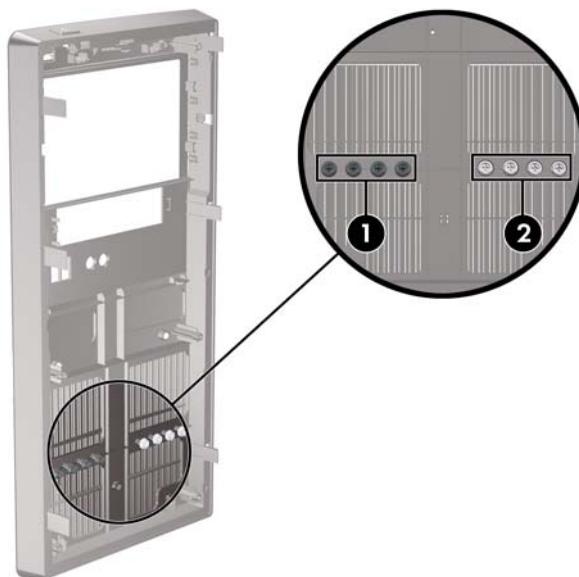
To verify the type, size, and capacity of the storage devices installed in the computer, run Computer Setup. Refer to the *Computer Setup (F10) Utility Guide* for more information.

Installing Additional Drives

When installing additional drives, follow these guidelines:

- The primary Serial ATA (SATA) hard drive must be connected to the dark blue primary SATA connector on the system board.
- Connect the first SATA optical drive to the white SATA connector on the system board.
- Always populate the dark blue and white connectors before the light blue and orange connectors.
- The system does not support Parallel ATA (PATA) optical drives or PATA hard drives.
- If needed, HP has provided extra drive retainer screws on the interior of the front bezel that are used to secure the drives in the drive cage. Hard drives use 6-32 standard screws. All other drives use M3 metric screws. The HP-supplied M3 metric guide screws (**1**) are black. The HP-supplied 6-32 standard screws (**2**) are silver.

Figure 6-14 Extra Drive Retainer Screws Location



△ **CAUTION:** To prevent loss of work and damage to the computer or drive:

If you are inserting or removing a drive, shut down the operating system properly, turn off the computer, and unplug the power cord. Do not remove a drive while the computer is on or in standby mode.

Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector.

Handle a drive carefully; do not drop it.

Do not use excessive force when inserting a drive.

Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields such as monitors or speakers.

If a drive must be mailed, place the drive in a bubble-pack mailer or other protective packaging and label the package "Fragile: Handle With Care."

System Board Drive Connections

Refer to the following illustration and table to identify the system board drive connectors.

Figure 6-15 System Board Drive Connections

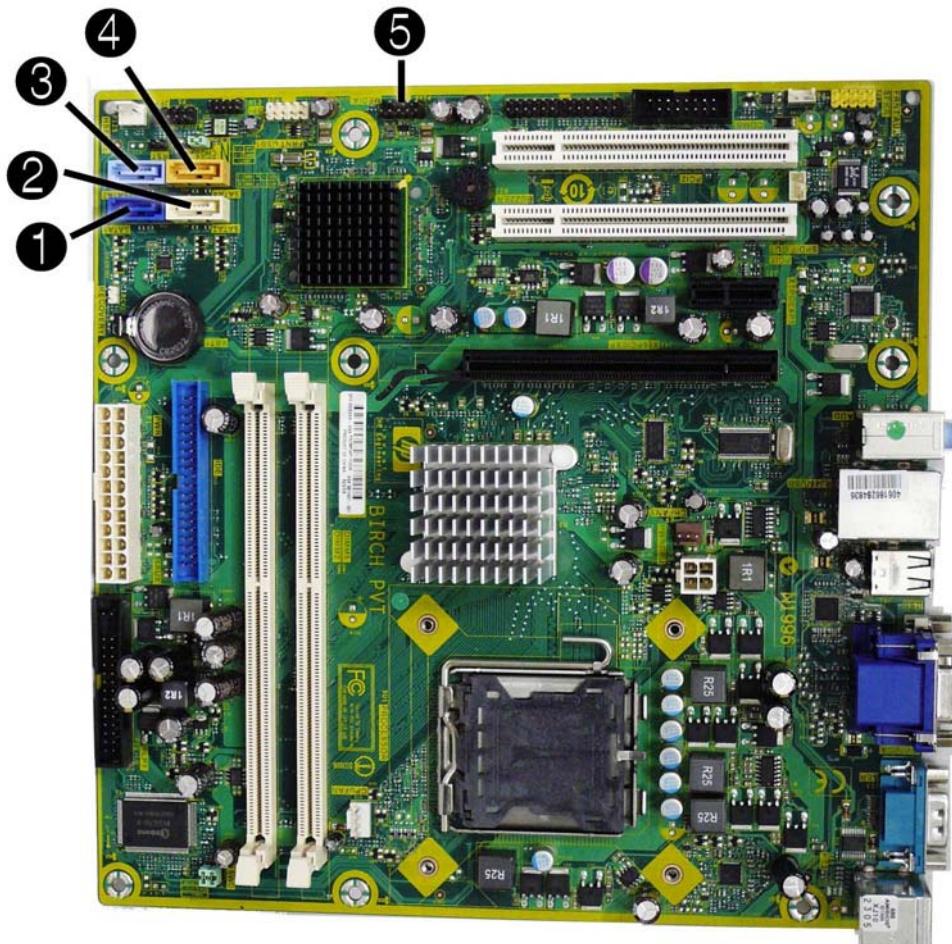


Table 6-3 System Board Drive Connections

No.	System Board Connector	System Board Label	Color
1	SATA1	SATA1	dark blue
2	SATA2	SATA2	white
3	SATA3	SATA3	light blue
4	SATA4	SATA4	orange
5	Media Card Reader	MEDIA	black

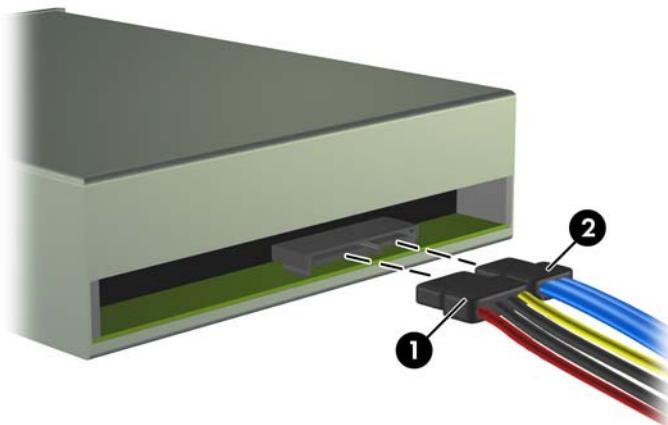
Removing an Optical Drive

△ **CAUTION:** All removable media should be taken out of a drive before removing the drive from the computer.

To remove an optical drive:

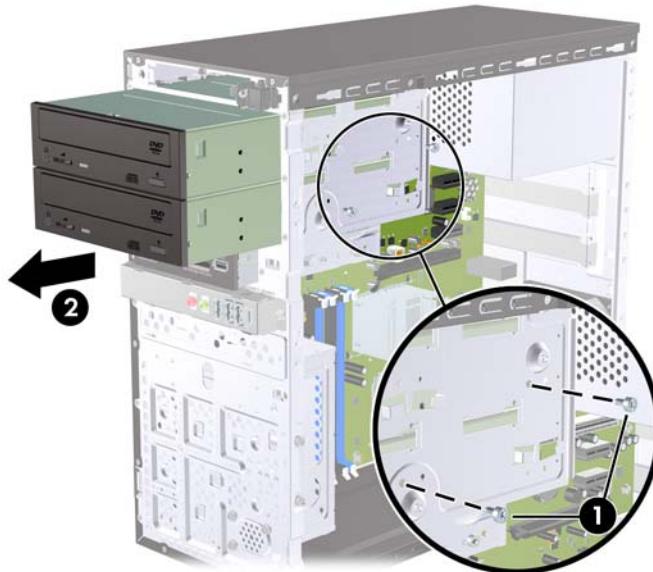
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Remove the front bezel ([Front Bezel on page 27](#)).
4. Disconnect the power cable (1) and data cable (2) from the rear of the optical drive.

Figure 6-16 Disconnecting the Power and Data Cables



5. Remove the two screws that secure the drive to the drive cage (1), then slide the drive out of the front of the chassis (2).

Figure 6-17 Removing the Optical Drive



 **NOTE:** To install an optical drive, refer to [Installing an Optical Drive into the 5.25-inch Drive Bay on page 43](#).

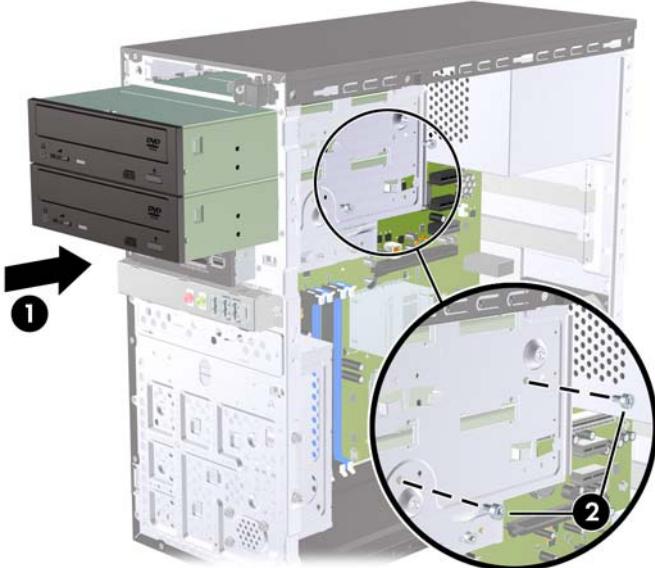
Installing an Optical Drive into the 5.25-inch Drive Bay

To install an optional 5.25-inch optical drive:

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Remove the front bezel ([Front Bezel on page 27](#)).
4. If you are installing a drive in a bay covered by a bezel blank, remove the front bezel then remove the bezel blank.
5. If you are adding a drive to an empty lower optical drive bay, you must remove the knockout plate from the bay. To do so, insert a flat screwdriver into the knockout plate slot and rotate the screwdriver to break the knockout plate out of the chassis. Discard the knockout plate.
6. If the new drive has screws installed on the sides of the drive, remove the screws before inserting the drive into the chassis.
7. Slide the drive in through the front of the chassis (1) until the screw holes on the drive are aligned with the screw holes on the drive cage and install the two M3 metric retainer screws (2) as shown in the following illustration.

 **NOTE:** Extra drive retainer screws are provided on the interior of the front bezel if needed. The M3 metric retainer screws for optical drives are black. Refer to [Installing Additional Drives on page 40](#) for an illustration of the retainer screws location.

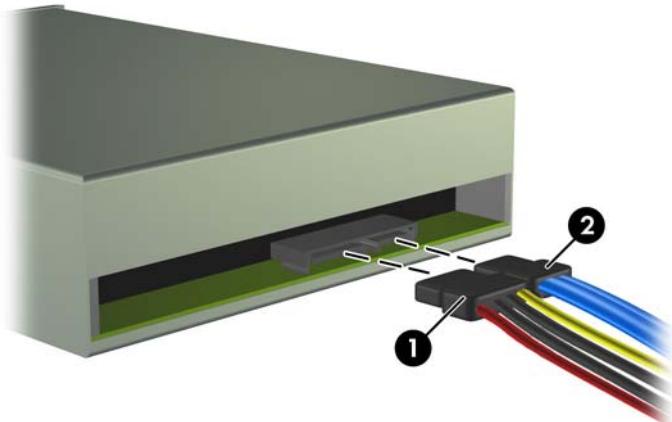
Figure 6-18 Installing the Optical Drive



8. If the system configuration includes only one optical drive, connect the SATA data cable to the white system board connector labeled SATA2. If you are adding a second optical drive, connect the SATA data cable to the orange system board connector labeled SATA4.

9. Connect the power cable (1) and data cable (2) to the rear of the optical drive.

Figure 6-19 Connecting the Power and Data Cables



10. Replace the front bezel and access panel.
11. Reconnect the power cord and turn on the computer.
12. Lock any security devices that were disengaged when the access panel was removed.

The system automatically recognizes the drive and reconfigures the computer.

Removing an External 3.5-inch Drive

△ **CAUTION:** All removable media should be taken out of a drive before removing the drive from the computer.

☞ **NOTE:** The 3.5-inch drive bay may contain a media card reader.

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Remove the front bezel ([Front Bezel on page 27](#)).
4. Disconnect the drive cables.
 - a. If you are removing a diskette drive (available on some models only), disconnect the data cable and power cable from the back of the drive.
 - b. If you are removing a media card reader, disconnect the USB cable from the system board.

5. Remove the two retainer screws that secure the drive to the bay (1) then slide the drive forward and out of the bay (2).

Figure 6-20 Removing a 3.5-inch Device (Media Card Reader Shown)



Installing a Drive into the 3.5-inch External Drive Bay

The 3.5-inch external drive bay on the front of the computer can be configured with a media card reader.

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Remove the front bezel ([Front Bezel on page 27](#)).
4. If you are installing a drive in a bay covered by a bezel blank, remove the front bezel then remove the bezel blank.
5. If you are adding a drive to an empty drive bay for the first time, you must remove the knockout plate from the bay. To do so, insert a flat screwdriver into the knockout plate slot and rotate the screwdriver to break the knockout plate out of the chassis. Discard the knockout plate.
6. If the new drive has screws installed on the sides of the drive, remove them before inserting the drive into the chassis.

7. Slide the drive in through the front of the chassis (1) until the bezel on the drive is evenly aligned with the computer front bezel and install the two M3 metric retainer screws (2) as shown in the illustration below.

 **NOTE:** Extra drive retainer screws are provided on the interior of the front bezel if needed. The M3 metric retainer screws for diskette drives or media card readers are black. Refer to [Installing Additional Drives on page 40](#) for an illustration of the retainer screws location.

Figure 6-21 Installing a 3.5-inch Device (Media Card Reader Shown)



8. Connect the appropriate drive cables:
 - If installing a diskette drive (available on some models only), connect the power and data cables to the rear of the drive and connect the other end of the data cable to the connector on the system board.
 - If installing a media card reader, connect the USB cable from the media card reader to the USB connector on the system board.
9. Replace the front bezel and access panel.
10. Reconnect the power cord and turn on the computer.
11. Lock any security devices that were disengaged when the access panel was removed.

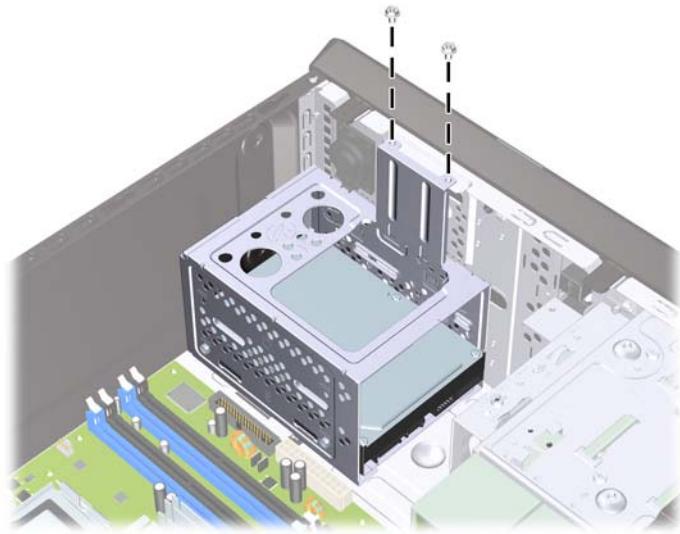
Removing an Internal 3.5-inch Hard Drive

 **NOTE:** Before you remove the old hard drive, be sure to back up the data from the old hard drive so that you can transfer the data to the new hard drive. Also, if you are replacing the primary hard drive, make sure you have created a Recovery Disc Set to restore the operating system, software drivers, and any software applications that were preinstalled on the computer. If you do not have this CD set, select **Start > HP Backup and Recovery** and create it now.

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).

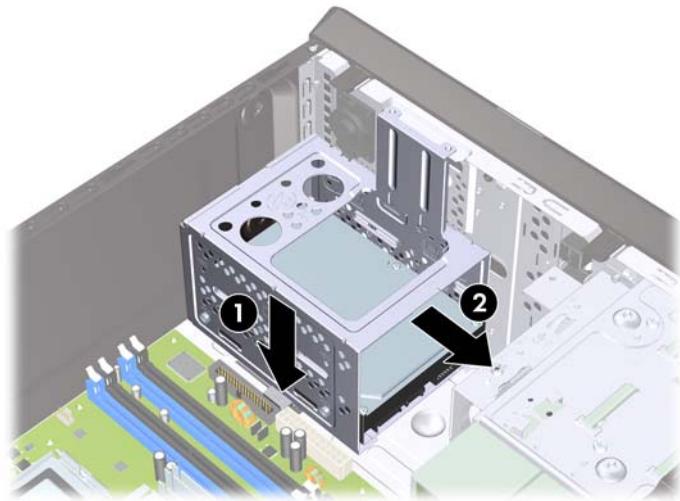
3. Remove the two screws that secure the hard drive cage to the chassis.

Figure 6-22 Removing the Hard Drive Cage Screws



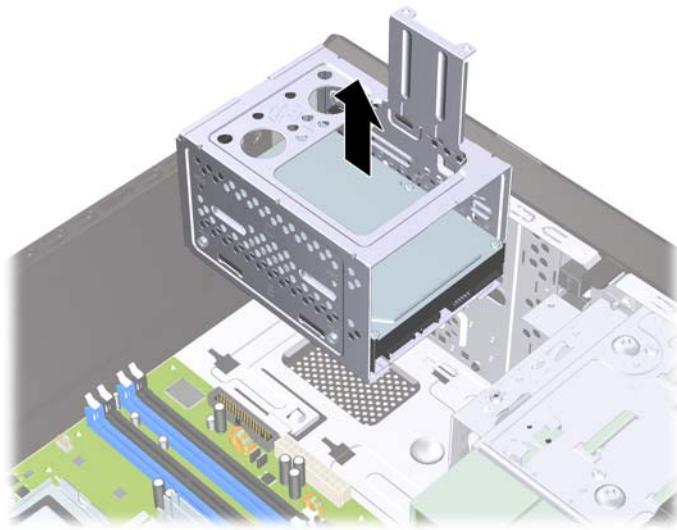
4. Push down the latch on the side of the hard drive cage (1), then slide the hard drive cage away from the bottom of the chassis (2) as shown below.

Figure 6-23 Releasing the Hard Drive Cage



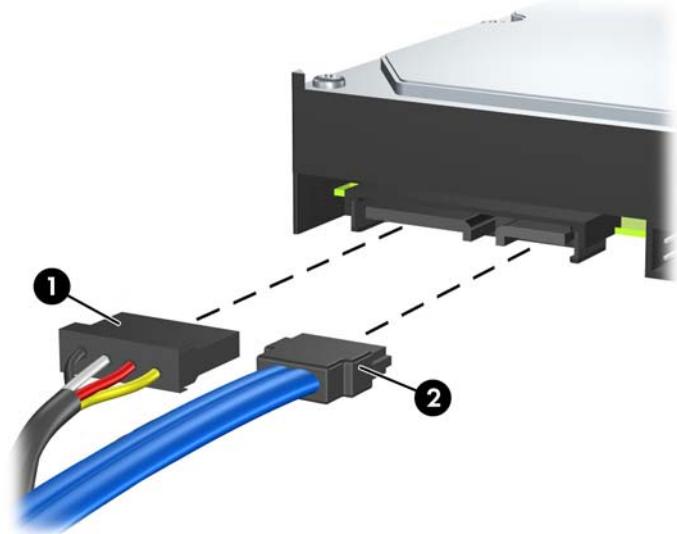
5. Lift the hard drive cage out of the chassis.

Figure 6-24 Removing the Hard Drive Cage



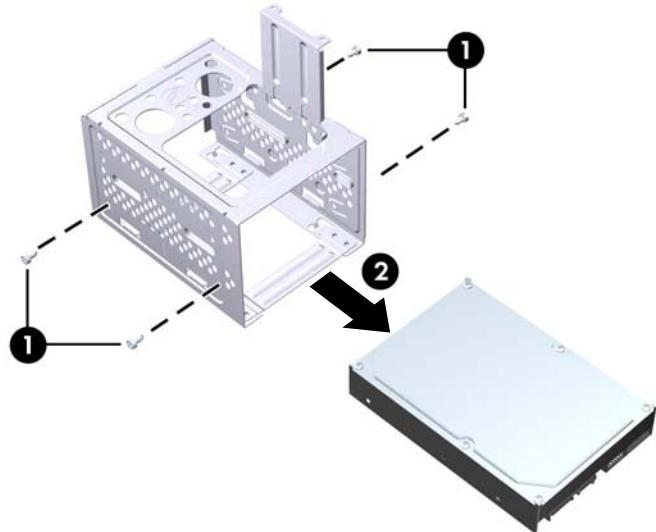
6. Disconnect the power cable (1) and data cable (2) from the back of the hard drive.

Figure 6-25 Disconnecting the Hard Drive Cables



7. Remove the four screws that secure the hard disk drive to the hard drive cage (1), then slide the hard disk drive out of the hard drive cage (2).

Figure 6-26 Removing the Hard Drive



 **NOTE:** To install an internal 3.5-inch hard drive, refer to [Installing an Internal 3.5-inch Hard Drive on page 50](#).

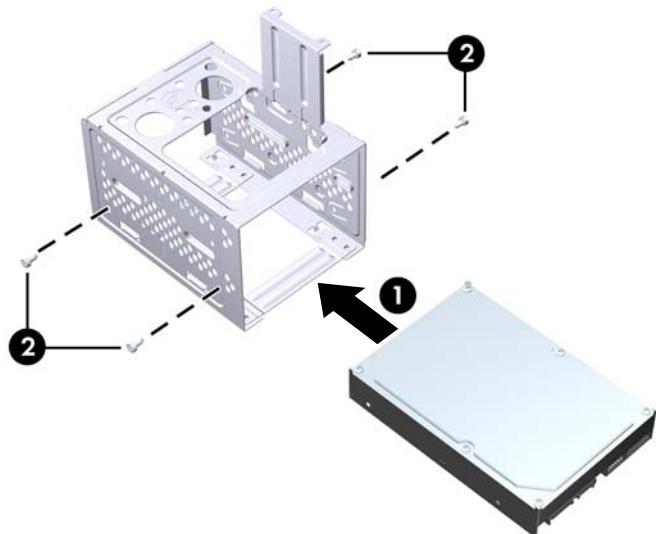
Installing an Internal 3.5-inch Hard Drive

1. Follow the steps in [Removing an Internal 3.5-inch Hard Drive on page 46](#) to remove the hard drive cage and, if necessary, the existing hard drive.
2. Slide the new drive into the hard disk drive cage (1), aligning the drive with the four screw holes on the cage. Install the four 6-32 standard screws that secure the hard disk drive to the hard disk drive cage (2). Make sure the hard disk drive cables are facing the top of the drive cage.

 **NOTE:** If you are replacing an old drive with a new drive, use the four retainer screws from the old drive to install the new drive.

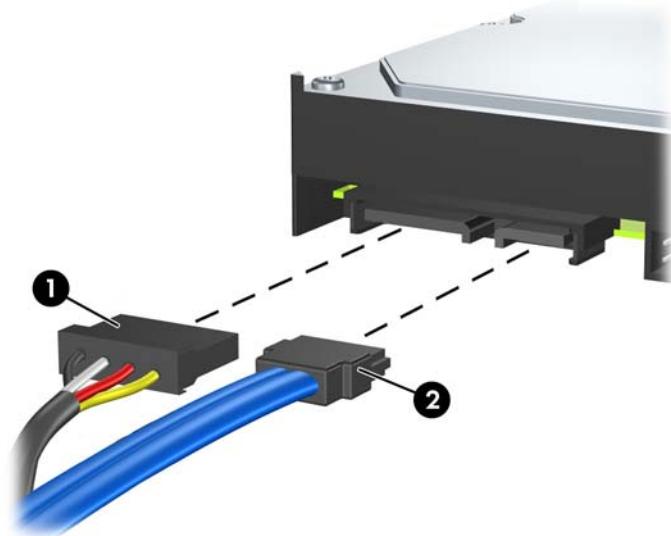
NOTE: If you are installing a second hard drive, use four of the extra standard 6-32 screws that are installed on the interior of the front bezel. The 6-32 screws are silver. Refer to [Installing Additional Drives on page 40](#) for an illustration of the retainer screws location.

Figure 6-27 Installing the Hard Drive in the Drive Cage



3. Connect the power cable (1) and data cable (2) to the back of the hard drive.

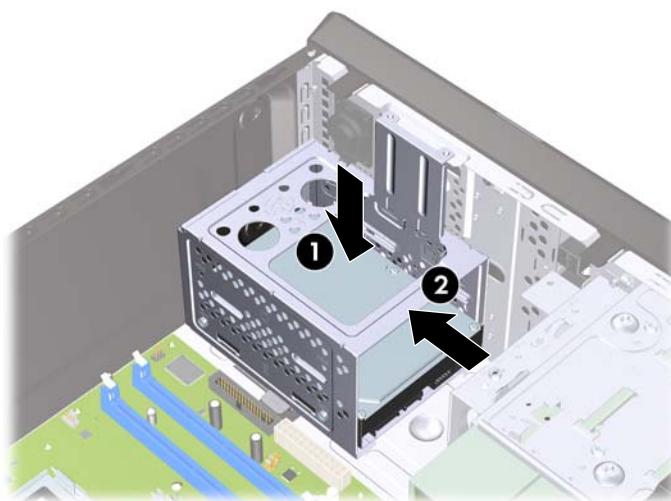
Figure 6-28 Connecting the Hard Drive Cables



△ **CAUTION:** Never crease or bend a SATA data cable tighter than a 30 mm (1.18 in) radius. A sharp bend can break the internal wires.

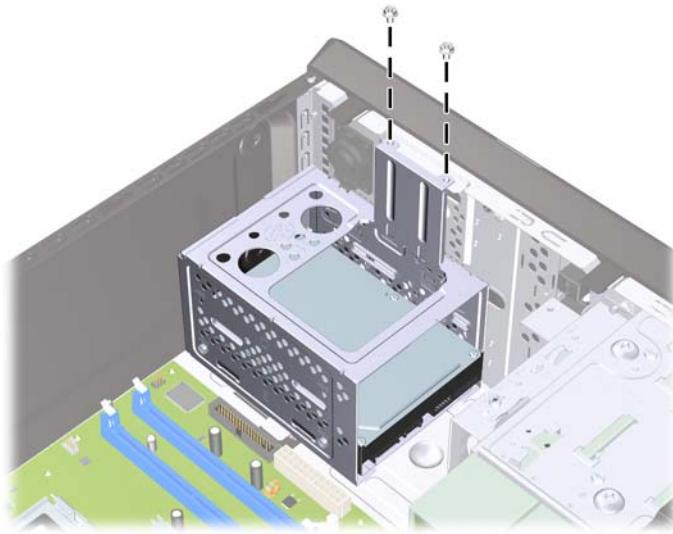
4. Place the hard disk drive cage into the chassis (1), then slide it down toward the bottom of the chassis until it locks into place (2).

Figure 6-29 Installing the Hard Drive Cage



5. Attach the two screws that secure the hard disk drive cage to the chassis.

Figure 6-30 Securing the Hard Drive Cage



6. If installing a new drive, connect the opposite end of the data cable to the appropriate system board connector. If your system has only one SATA hard drive, you must connect the hard drive data cable to the dark blue connector to avoid any hard drive performance problems. If you are adding a second hard drive, connect the data cable to the next available (unpopulated) SATA connector on the system board.

NOTE: If your system has only one SATA hard drive, you must connect the hard drive data cable to the dark blue SATA on the system board to avoid any hard drive performance problems. If you are adding a second hard drive, connect the data cable to the next available (unpopulated) SATA connector on the system board.

7. Replace the computer access panel.
8. Reconnect the power cord and any external devices, then turn on the computer.
9. Lock any security devices that were disengaged when the access panel was removed.

Front I/O and USB Panel Housing Assembly

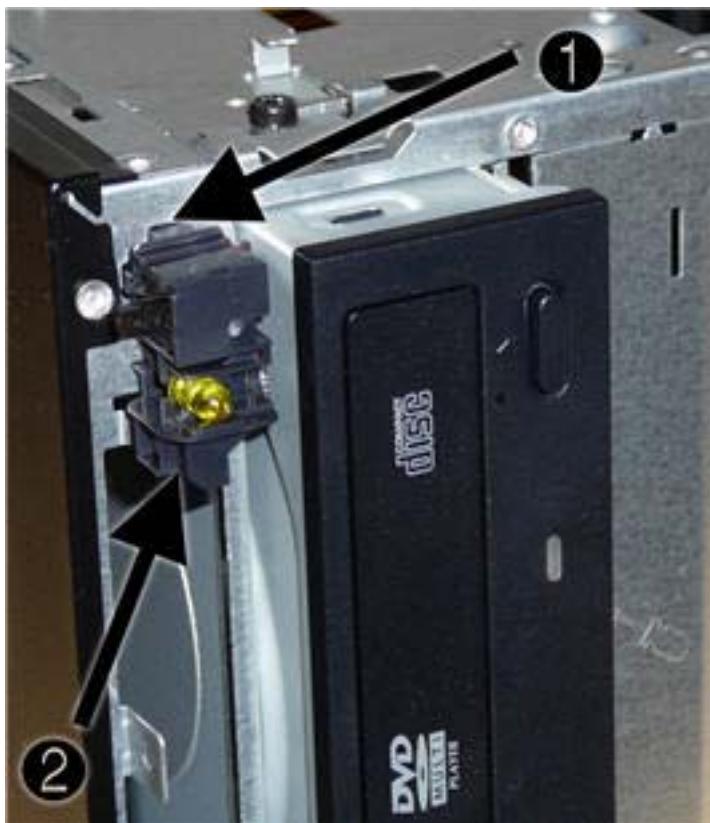
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#))
3. Lay the computer on its side with the front facing toward you.
4. Remove the front bezel ([Front Bezel on page 27](#)).
5. Unplug the four cables that connect the assembly to the system board. The assembly cables connect to the following system board connectors:
 - F_AUDIO – yellow
 - F_USB1 – white
6. Remove the screw (1) that secures the housing to the chassis, slide the housing up (2), and then pull the assembly away from the chassis while guiding the cables through the hole in the chassis.



To install the housing assembly, reverse the removal procedures.

Power Switch/LED Assembly

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Lay the computer on its side with the front facing toward you.
4. Remove the front bezel ([Front Bezel on page 27](#)).
5. Remove the optical drive ([Removing an Optical Drive on page 42](#)).
6. Disconnect the braided cables from the black system board connector labeled JFP1.
7. Remove the cable from the clips in the optical drive cage.
8. Press the tab on the top of the switch holder (1) to disengage it from the chassis, lift the switch upward to disengage the tab at the bottom of the switch (2) from the chassis, and then pull the power switch away from the chassis while guiding the wires through the hole in the chassis.



To install the power switch/LED assembly, reverse the removal procedures.

System Fan

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Lay the computer on its side with the rear facing toward you.
4. Disconnect the cable from the red/brown system board connector labeled CH_FAN1.
5. Remove the four Phillips screws that secure the fan to the chassis, rotate the top of the fan forward, and then remove the fan from the chassis.

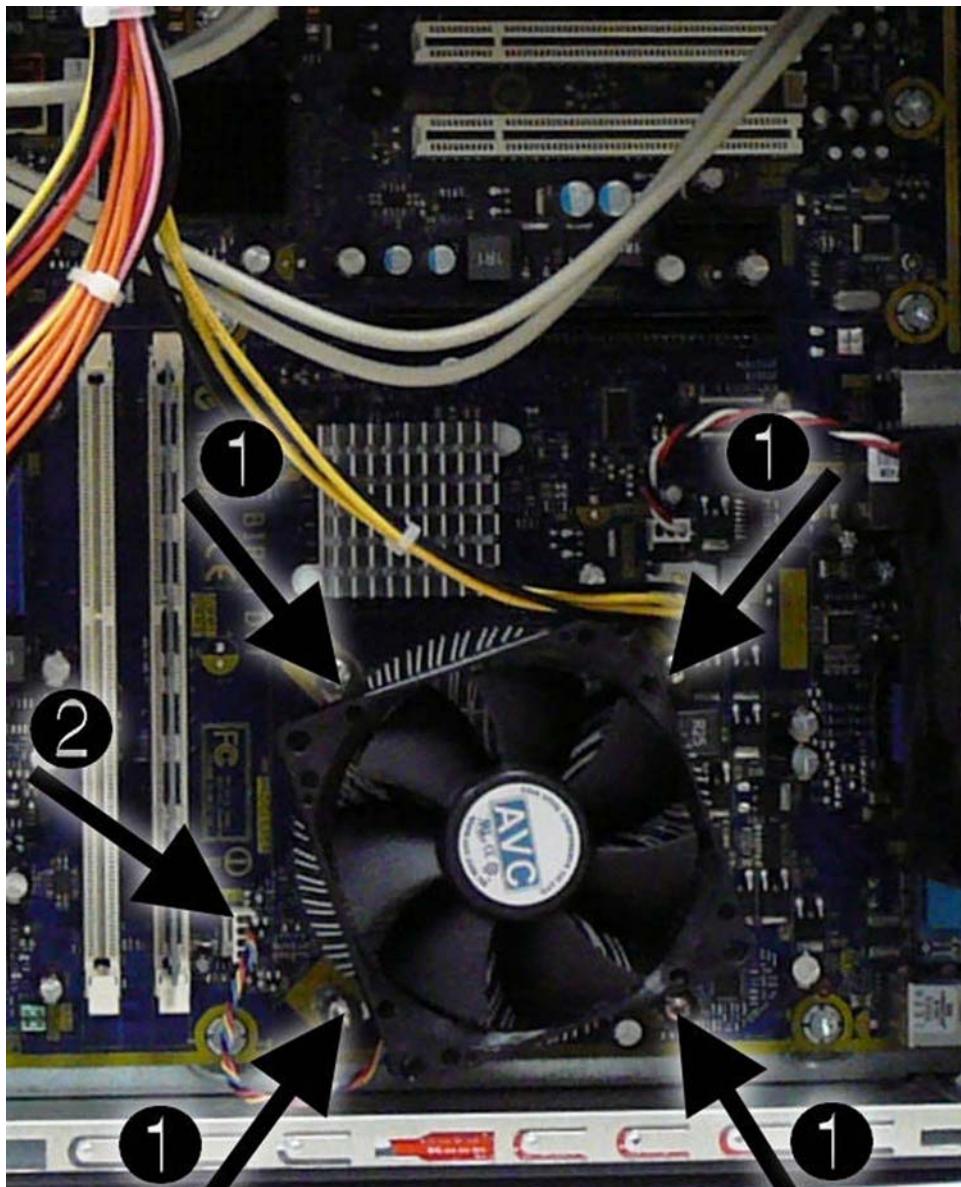


 **NOTE:** System board appearance may vary.

To install the fan, reverse the removal procedures.

Heat sink assembly

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Lay the computer on its side with the rear facing toward you.
4. Loosen the four captive torx T15 screws (1) that secure the heat sink to the system board.
5. Disconnect the heat sink fan control cable (2) from the white system board connector labeled CPUFAN.



 **NOTE:** System board appearance may vary.

6. Lift the heat sink from the processor and set it on its side to keep from contaminating the work area with thermal grease.

△ **CAUTION:** Heat sink retaining screws should be tightened in diagonally opposite pairs (as in an X) to evenly seat the heat sink to the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.

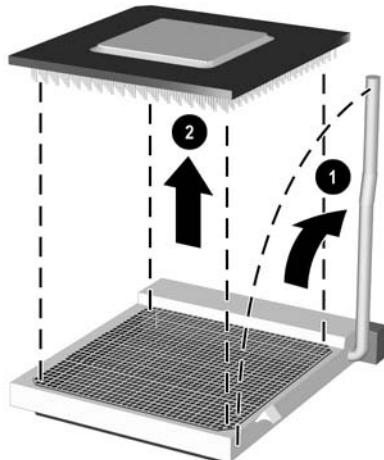
When reinstalling an existing heat sink, make sure that its bottom has been cleaned with an alcohol wipe and fresh thermal grease has been applied to the top of the processor. New heatsinks come from the factory with fresh thermal grease already applied.

Processor

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Lay the computer on its side with the rear facing toward you.
4. Disconnect the heatsink control cable from the system board and remove the heatsink [Heat sink assembly on page 56](#).
5. Rotate the locking lever to its full open position (1).
6. Carefully lift the processor from the socket (2).

△ **CAUTION:** Do NOT handle the pins in the processor socket. These pins are very fragile and handling them could cause irreparable damage. Once pins are damaged it may be necessary to replace the system board.

CAUTION: The heatsink must be installed within 24 hours of installing the processor to prevent damage to the processor's solder connections.



To install a new processor:

1. Place the processor in its socket and close the retainer.
2. Secure the locking lever.

If reusing the existing heat sink, go to step 3.

If using a new heat sink, go to step 6.

3. If reusing the existing heat sink, clean the bottom of the heat sink with the alcohol pad provided in the spares kit.
4. Apply the thermal grease provided in the spares kit to the top of the processor and install the heat sink atop the processor.
5. Go to step 7.
6. If using a new heat sink, remove the protective covering from the bottom of the heat sink and place it in position atop the processor.
7. Secure the heat sink to the system board and system board tray with the 4 captive screws and attach the heat sink control cable to the system board.

 **CAUTION:** Heat sink retaining screws should be tightened in diagonally opposite pairs (as in an X) to evenly seat the heat sink on the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.

 **NOTE:** After installing a new processor onto the system board, always update the system ROM to ensure that the latest version of the BIOS is being used on the computer. The latest system ROM BIOS can be found on the Web at: <http://h18000.www1.hp.com/support/files>.

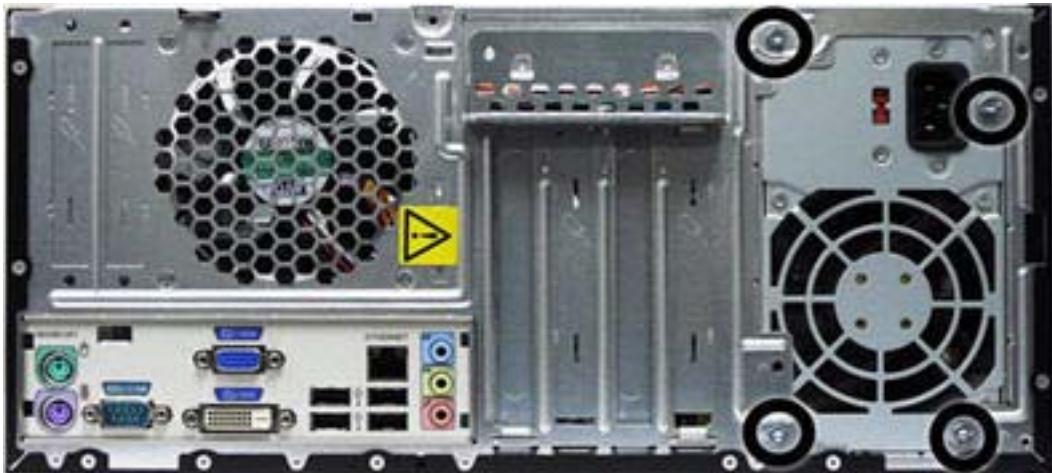
Power Supply

 **WARNING!** Voltage is always present on the system board when the computer is plugged into an active AC outlet. To avoid possible personal injury and damage to the equipment the power cord should be disconnected from the computer and/or the AC outlet before opening the computer.

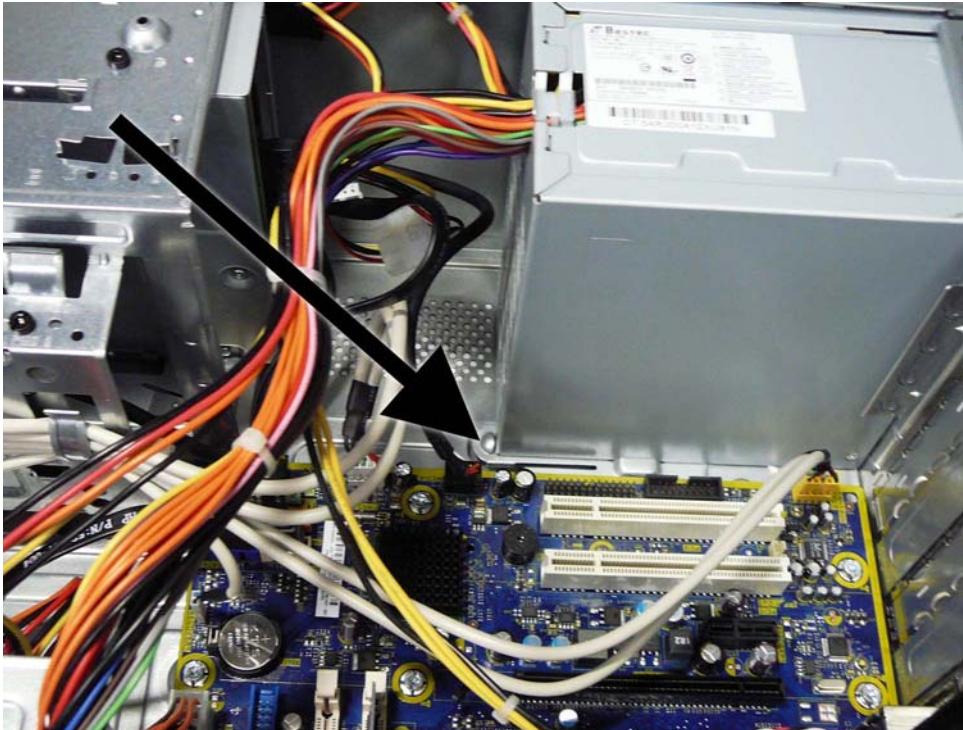
 **NOTE:** When installing a new power supply, be sure to set the red switch to the setting (230 V or 115 V) appropriate for the country in which the computer is used. Spare power supplies normally arrive set for 230 V.

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Lay the computer on its side with the rear facing toward you.
4. Disconnect all power cables from the mass storage devices and from the system board.

5. Remove the four screws that secure the power supply to the chassis.



6. Inside of the unit, press the power supply release latch on the chassis base, and then lift up the rear of the power supply to disengage it from the chassis.



NOTE: System board appearance may vary.

7. Slide the power supply toward the front/bottom of the computer, then lift the power supply out of the computer.

To install the power supply, reverse the removal procedure.

System Board

When replacing the system board, be sure that the following components are removed from the defective system board and installed on the replacement system board:

- Memory modules
- Processor
- Expansion cards

To remove the system board:

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).
3. Lay the computer on its side with the rear facing toward you.
4. Remove the front bezel ([Front Bezel on page 27](#)).
5. Remove an expansion cards ([Expansion Cards on page 33](#)).
6. Disconnect the power, and data cables from the back of all installed drives.
7. Disconnect all cables from the system board.
8. Remove the eight screws that secure the system board to the chassis.



 **NOTE:** System board appearance varies by model.

9. Slide the system board toward the front of the chassis, and then lift it up and out of the chassis.

 **NOTE:** The system board in the computer may look slightly different from the one shown here.

To install the system board, reverse the removal procedure.

 **NOTE:** When replacing the system board, you must also change the chassis serial number in the BIOS.

NOTE: After installing a new system board, always update the system ROM to ensure that the latest version of the BIOS is being used on the computer. The latest system ROM BIOS can be found at: <http://h18000.www1.hp.com/support/files>.

Battery

The battery that comes with your computer provides power to the real-time clock and has a lifetime of about three years. When replacing the battery, use a battery equivalent to the battery originally installed on the computer. The computer comes with a 3-volt lithium coin cell battery.

 **NOTE:** The lifetime of the lithium battery can be extended by plugging the computer into a live AC wall socket. The lithium battery is only used when the computer is NOT connected to AC power.

 **WARNING!** This computer contains an internal lithium manganese dioxide battery. There is a risk of fire and burns if the battery is not handled properly. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose to temperatures higher than 60°C (140°F)
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace the battery only with the HP/Compaq spare designated for this product.

 **CAUTION:** Before replacing the battery, it is important to back up the computer CMOS settings. When the battery is removed or replaced, the CMOS settings will be cleared. Refer to the *Troubleshooting Guide* for information on backing up the CMOS settings.

 **NOTE:** Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, its authorized partners, or its agents.

 **CAUTION:** Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

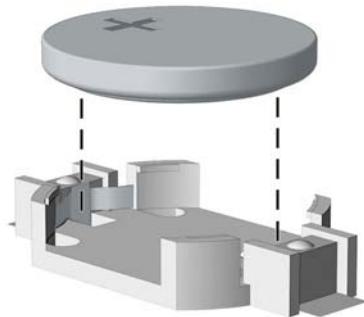
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 25](#)).
2. Remove the access panel ([Access Panel on page 26](#)).

 **NOTE:** It may be necessary to remove an expansion card to gain access to the battery.

3. Locate the battery and battery holder on the system board.

Type 1 Battery Holder

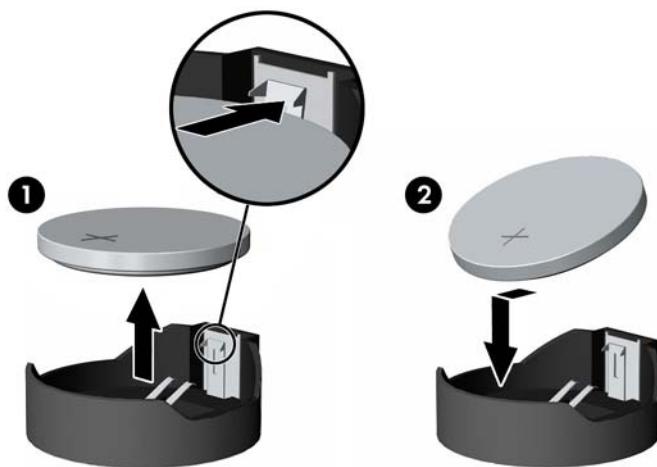
1. Lift the battery out of its holder.



2. Slide the replacement battery into position, positive side up.
3. The battery holder automatically secures the battery in the proper position.
4. Replace the computer access panel.
5. Plug in the computer and turn on power to the computer.
6. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to the *Computer Setup (F10) Utility Guide*.

Type 2 Battery Holder

1. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery. When the battery pops up, lift it out (1).
2. To insert the new battery, slide one edge of the replacement battery under the holder's lip with the positive side up (2). Push the other edge down until the clamp snaps over the other edge of the battery.

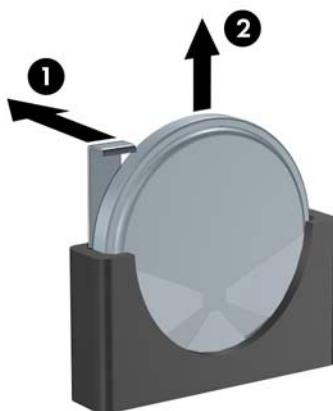


3. Replace the computer access panel.

4. Plug in the computer and turn on power to the computer.
5. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to the *Computer Setup (F10) Utility Guide*.

Type 3 Battery Holder

1. Pull back on the clip (1) that holds the battery in place, then remove the battery (2).
2. Insert the new battery and position the clip back in place.



3. Replace the computer access panel.
4. Plug in the computer and turn on power to the computer.
5. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to the *Computer Setup (F10) Utility Guide*.

Installing a Security Lock

The security locks displayed below and on the following pages can be used to secure the computer.

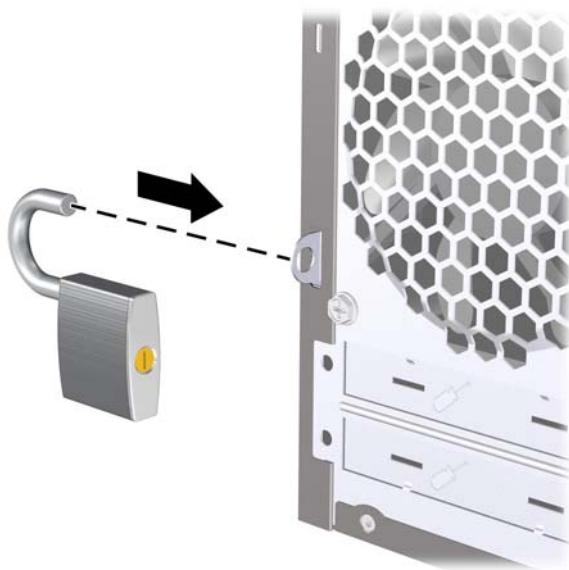
HP/Kensington MicroSaver Security Cable Lock

Figure 6-31 Installing a Cable Lock



Padlock

Figure 6-32 Installing a Padlock



HP Business PC Security Lock

1. Fasten the security cable by looping it around a stationary object.

Figure 6-33 Securing the Cable to a Fixed Object



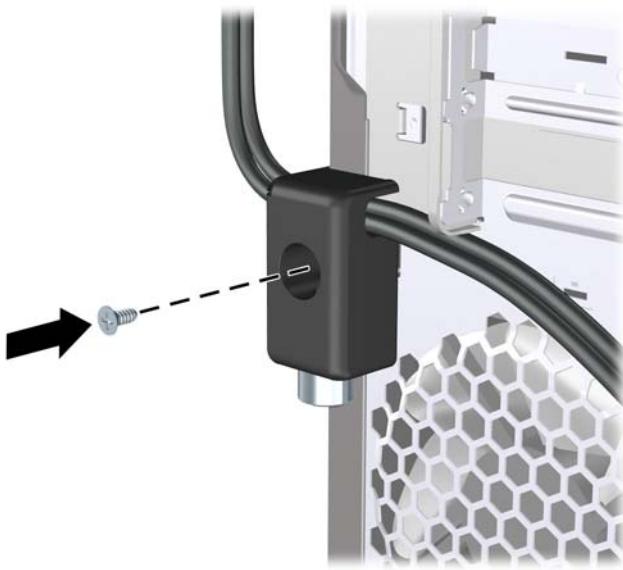
2. Thread the keyboard and mouse cables through the lock.

Figure 6-34 Threading the Keyboard and Mouse Cables



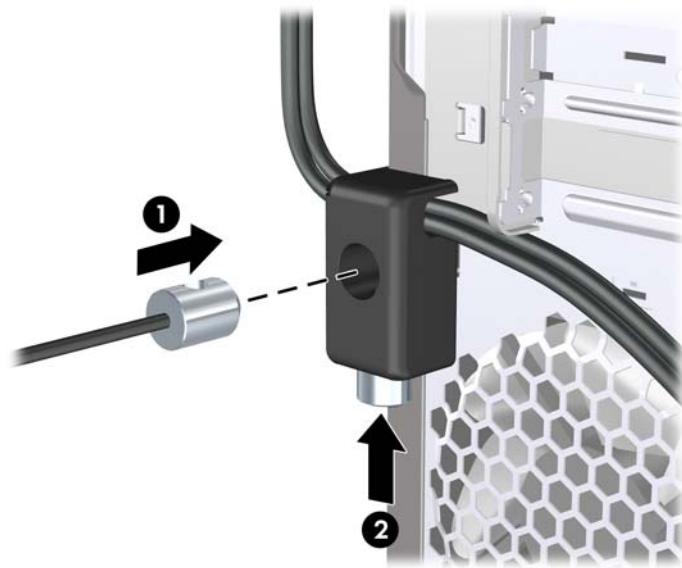
3. Screw the lock to the chassis using the screw provided.

Figure 6-35 Attaching the Lock to the Chassis



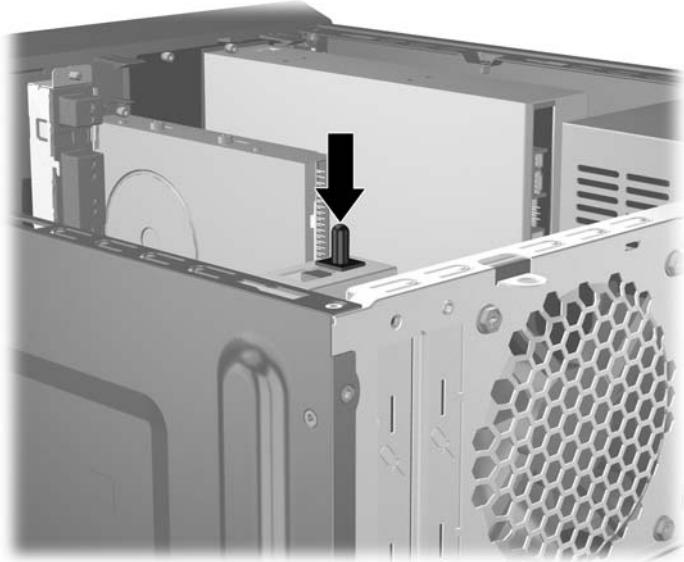
4. Insert the plug end of the security cable into the lock (1) and push the button in (2) to engage the lock. Use the key provided to disengage the lock.

Figure 6-36 Engaging the Lock



Hood Sensor

If the access panel is removed while there is still power to the computer, the hood sensor will cause the system to stop and display the Error 912 message after system reboot and will beep 5 times for 5 seconds. If the alarm sounds, close the access panel, tighten the thumbscrew, then reboot the system. The system will enter the operating system successfully. If the error message persists, press the **F10** key immediately when the HP Logo screen is displayed to enter the Computer Setup menu. In the menu, select **Advanced > Hood Sensor > Reset Case Open Status** and make sure **Enable** is selected, then press the **F10** key to Save and Exit, then reboot the system.



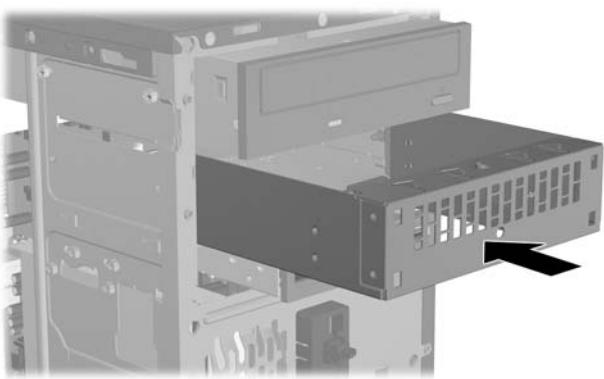
HP Chassis Security Kit

An optional HP Chassis Security Kit prevents computer components from being removed through an open optical drive bay.

Figure 6-37 HP Chassis Security Kit



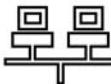
Figure 6-38 Installing the HP Chassis Security Kit



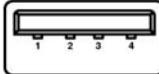
A Connector Pin Assignments

This appendix contains the pin assignments for many computer and workstation connectors. Some of these connectors may not be used on the product being serviced.

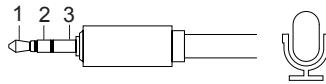
Ethernet BNC

Connector and Icon	Pin	Signal
	1	Data
	2	Ground

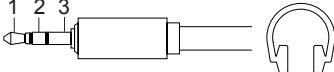
USB

Connector and Icon	Pin	Signal
	1	+5 VDC
	2	- Data
	3	+ Data
	4	Ground

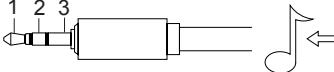
Microphone

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_left
	2 (Ring)	Audio_Right
	3 (Shield)	Ground

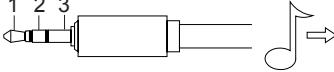
Headphone

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_left
	2 (Ring)	Power_Right
	3 (Shield)	Ground

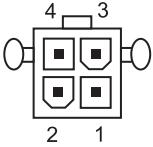
Line-in Audio

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_In_Left
	2 (Ring)	Audio_In_Right
	3 (Shield)	Ground

Line-out Audio

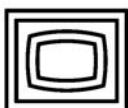
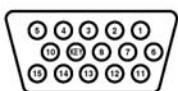
Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Out_Left
	2 (Ring)	Audio_Out_Right
	3 (Shield)	Ground

4-Pin Power (for CPU)

Connector and Icon	Pin	Signal
	1	GND
	2	GND
	3	+12V CPU
	4	-12V CPU

Monitor

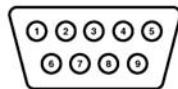
Connector and Icon



Pin	Signal	Pin	Signal
1	Red Analog	9	+5V (fused)
2	Green Analog	10	Ground
3	Blue Analog	11	Not used
4	Not used	12	DDC Serial Data
5	Ground	13	Horizontal Sync
6	Ground	14	Vertical Sync
7	Ground	15	DDC Serial Clock
8	Ground		

Serial Interface, Powered and Non-Powered

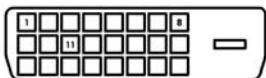
Connector and Icon



Connector and Icon	Pin	Signal
	1	Carrier Detect (12V if powered)
	2	Receive Data
	3	Transmit Data
	4	Data Terminal Ready
	5	Signal Ground
	6	Data Set Ready
	7	Request to Send
	8	Clear to Send
	9	Ring Indicator (5V if powered)

DVI Connector

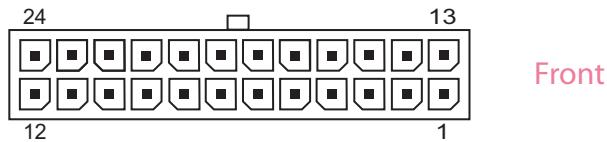
Connector and Icon



Pin	Signal	Pin	Signal
1	T.M.D.S. Data2-	13	T.M.D.S. Data3+
2	T.M.D.S. Data2+	14	+5V Power
3	T.M.D.S. Data2/4 Shield	15	Ground (for +5V)
4	T.M.D.S. Data4-	16	Hot Pug Detect
5	T.M.D.S. Data4+	17	T.M.D.S. Data0-
6	DDC Clock	18	T.M.D.S. Data0+
7	DDC Data	19	T.M.D.S. Data0/5 Shield
8	No Connect	20	T.M.D.S. Data5-
9	T.M.D.S. Data1-	21	T.M.D.S. Data5+
10	T.M.D.S. Data1+	22	T.M.D.S. Data Shield
11	T.M.D.S. Data1/3 Shield	23	T.M.D.S. Clock+
12	T.M.D.S. Data3-	24	T.M.D.S. Clock-

24-Pin Power

Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3V	7	GND	13	+3.3V	19	GND
2	+3.3V	8	POK	14	-12V	20	open
3	GND	9	+5 Vaux	15	GND	21	+5V
4	+5V	10	+12V	16	PSON	22	+5V
5	GND	11	+12V	17	GND	23	+5V
6	+5V	12	+3.3V	18	GND	24	GND

PCI Express

x1, x4, x8, and x16 PCI Express Connector



Pin A

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	PRSNT1	6	JTAG3	11	PERST#	16	PERp0	21	PERp1
2	+12V	7	JTAG4	12	GND	17	PERn0	22	PERn1
3	+12V	8	JTAG5	13	REFCLK+	18	GND	23	GND
4	GND	9	+3.3V	14	REFCLK-	19	RSVD	24	GND
5	JTAG2	10	+3.3V	15	GND	20	GND	25	PERp2
26	PERn(2)	31	GND	36	PERn4	41	GND	46	GND
27	GND	32	RSVD	37	GND	42	GND	47	PERp7
28	GND	33	RSVD	38	GND	43	PERp6	48	PERn7
29	PERp3	34	GND	39	PERp5	44	PERn6	49	GND
30	PERn3	35	PERp4	40	PERn5	45	GND	50	RSVD
51	GND	56	PERp9	61	PERn10	66	GND	71	GND
52	PERp8	57	PERn9	62	GND	67	GND	72	PERp13
53	PERn8	58	GND	63	GND	68	PERp12	73	PERn13
54	GND	59	GND	64	PERp11	69	PERn12	74	GND
55	GND	60	PERp10	65	PERn11	70	GND	75	GND
76	PERp14	81	PERn15						
77	PERn14	82	GND						
78	GND								
79	GND								
80	PERp15								

Pin B information is on the next page

NOTE: x1 PCI Express uses pins 1-18

x4 PCI Express uses pins 1-32

x8 PCI Express uses pins 1-49

x16 PCI Express uses pins 1-8

PCI Express

x1, x4, x8, and x16 PCI Express Connector



Pin B

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+12V	6	SMDAT	11	WAKE#	16	GND	21	GND
2	+12V	7	GND	12	RSVD	17	GND	22	GND
3	RSVD	8	+3.3 V	13	GND	18	PETp1	23	PETp2
4	GND	9	JTAG1	14	PETp0	19	PETn1	24	PETn2
5	SMCLK	10	3.3vAux	15	PETn0	20		25	GND
26	GND	31	PRSNT2#	36	GND	41	PETp6	46	PETn7
27	PETp3	32	GND	37	PETp5	42	PRTn6	47	GND
28	PETn3	33	PETp4	38	PETn5	43	GND	48	PRSNT2#
29	GND	34	PETn4	39	GND	44	GND	49	GND
30	RSVD	35	GND	40	GND	45	PETp7	50	PETp8
51	PETn8	56	GND	61	GND	66	PETp12	71	PETn13
52	GND	57	GND	62	PETp11	67	PETn12	72	GND
53	GND	58	PETp10	63	PETn11	68	GND	73	GND
54	PETp9	59	PETn10	64	GND	69	GND	74	PETp14
55	PETn9	60	GND	65	GND	70	PETp13	75	PETn14
76	GND	81	PRSNT2#						
77	GND	82	RSVD						
78	PETp15								
79	PETn15								
80	GND								

Pin B information is on the next page

NOTE: x1 PCI Express uses pins 1-18

x4 PCI Express uses pins 1-32

x8 PCI Express uses pins 1-49

x16 PCI Express uses pins 1-8

B Power Cord Set Requirements

The power supplies on some computers have external power switches. The voltage select switch feature on the computer permits it to operate from any line voltage between 100-120 or 220-240 volts AC. Power supplies on those computers that do not have external power switches are equipped with internal switches that sense the incoming voltage and automatically switch to the proper voltage.

The power cord set received with the computer meets the requirements for use in the country where you purchased the equipment.

Power cord sets for use in other countries must meet the requirements of the country where you use the computer.

General Requirements

The requirements listed below are applicable to all countries:

1. The power cord must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be installed.
2. The power cord set must have a minimum current capacity of 10A (7A Japan only) and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.
3. The diameter of the wire must be a minimum of 0.75 mm₂ or 18AWG, and the length of the cord must be between 1.8 m (6 feet) and 3.6 m (12 feet).

The power cord should be routed so that it is not likely to be walked on or pinched by items placed upon it or against it. Particular attention should be paid to the plug, electrical outlet, and the point where the cord exits from the product.

⚠ WARNING! Do not operate this product with a damaged power cord set. If the power cord set is damaged in any manner, replace it immediately.

Japanese Power Cord Requirements

For use in Japan, use only the power cord received with this product.

⚠ CAUTION: Do not use the power cord received with this product on any other products.

Country-Specific Requirements

Additional requirements specific to a country are shown in parentheses and explained below.

Country	Accrediting Agency	Country	Accrediting Agency
Australia (1)	EANSW	Italy (1)	IMQ
Austria (1)	OVE	Japan (3)	METI
Belgium (1)	CEBC	Norway (1)	NEMKO
Canada (2)	CSA	Sweden (1)	SEMKO
Denmark (1)	DEMKO	Switzerland (1)	SEV
Finland (1)	SETI	United Kingdom (1)	BSI
France (1)	UTE	United States (2)	UL
Germany (1)	VDE		

1. The flexible cord must be Type HO5VV-F, 3-conductor, 0.75mm₂ conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. The flexible cord must be Type SVT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A, 250V) configuration.
3. Appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 0.75 mm₂ conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

C Troubleshooting Without Diagnostics

This chapter provides information on how to identify and correct minor problems, such as hard drive, optical drive, graphics, audio, memory, and software problems. If you encounter problems with the computer, refer to the tables in this chapter for probable causes and recommended solutions.

Safety and Comfort

⚠️ WARNING! Misuse of the computer or failure to establish a safe and comfortable work environment may result in discomfort or serious injury. Refer to the *Safety & Comfort Guide* at <http://www.hp.com/ergo> for more information on choosing a workspace and creating a safe and comfortable work environment. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. For more information, refer to the *Safety & Regulatory Information* guide.

Before You Call for Technical Support

If you are having problems with the computer, try the appropriate solutions below to try to isolate the exact problem before calling for technical support.

- Run the HP diagnostic tool.
- Run the hard drive self-test in Computer Setup. Refer to the *Computer Setup (F10) Utility Guide* for more information.
- Listen for beeps from the computer. The beeps are error codes that will help you diagnose the problem. Refer to [Interpreting Power LED and Beep Codes on page 109](#) for more information.
- If the screen is blank, plug the monitor into a different video port on the computer if one is available. Or, replace the monitor with a monitor that you know is functioning properly.
- If you are working on a network, plug another computer with a different cable into the network connection. There may be a problem with the network plug or cable.
- If you recently added new hardware, remove the hardware and see if the computer functions properly.
- If you recently installed new software, uninstall the software and see if the computer functions properly.
- Boot the computer to the Safe Mode to see if it will boot without all of the drivers loaded. When booting the operating system, use “Last Known Configuration.”
- Refer to the comprehensive online technical support at <http://www.hp.com/support>.
- Refer to [Helpful Hints on page 78](#) in this guide.

To assist you in resolving problems online, HP Instant Support Professional Edition provides you with self-solve diagnostics. If you need to contact HP support, use HP Instant Support Professional Edition's online chat feature. Access HP Instant Support Professional Edition at: <http://www.hp.com/go/ispe>.

Access the Business Support Center (BSC) at <http://www.hp.com/go/bizsupport> for the latest online support information, software and drivers, proactive notification, and worldwide community of peers and HP experts.

If it becomes necessary to call for technical assistance, be prepared to do the following to ensure that your service call is handled properly:

- Be in front of your computer when you call.
- Write down the computer serial number, product ID number, and monitor serial number before calling.
- Spend time troubleshooting the problem with the service technician.
- Remove any hardware that was recently added to your system.
- Remove any software that was recently installed.

 **NOTE:** For sales information and warranty upgrades (Care Packs), call your local authorized service provider or dealer.

Helpful Hints

If you encounter problems with the computer, monitor, or software, see the following list of general suggestions before taking further action:

- Check that the computer and monitor are plugged into a working electrical outlet.
- Check that the voltage select switch (some models) is set to the appropriate voltage for your region (115V or 230V).
- Check that the computer is turned on and the green power light is on.
- Check that the monitor is turned on and the monitor light is on.
- Listen for beeps from the computer. The beeps are error codes that will help you diagnose the problem. Refer to [Interpreting Power LED and Beep Codes on page 109](#) for more information.
- Turn up the brightness and contrast controls of the monitor if the monitor is dim.
- Press and hold any key. If the system beeps, then the keyboard should be operating correctly.
- Check all cable connections for loose connections or incorrect connections.
- Wake the computer by pressing any key on the keyboard or pressing the power button. If the system remains in suspend mode, shut down the computer by pressing and holding the power button for at least four seconds then press the power button again to restart the computer. If the system will not shut down, unplug the power cord, wait a few seconds, then plug it in again. The computer will restart if it is set to power on automatically as soon as power is restored in Computer Setup. If it does not restart, press the power button to start the computer.
- Reconfigure the computer after installing a non-plug and play expansion board or other option. See [Solving Hardware Installation Problems on page 96](#) for instructions.

- Be sure that all the needed device drivers have been installed. For example, if you are using a printer, you need a driver for that model printer.
- Remove all bootable media (CD or USB device) from the system before turning it on.
- If you have installed an operating system other than the factory-installed operating system, check to be sure that it is supported on the system.
- If the system has multiple video sources (embedded, PCI, or PCI-Express adapters) installed (embedded video on some models only) and a single monitor, the monitor must be plugged into the monitor connector on the source selected as the primary VGA adapter. During boot, the other monitor connectors are disabled and if the monitor is connected into these ports, the monitor will not function. You can select which source will be the default VGA source in Computer Setup.

△ **CAUTION:** When the computer is plugged into an AC power source, there is always voltage applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

Solving General Problems

You may be able to easily resolve the general problems described in this section. If a problem persists and you are unable to resolve it yourself or if you feel uncomfortable about performing the operation, contact an authorized dealer or reseller.

⚠️ WARNING! When the computer is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

Table C-1 Solving General Problems

Computer appears locked up and will not turn off when the power button is pressed.

Cause	Solution
Software control of the power switch is not functional.	<ol style="list-style-type: none">1. Press and hold the power button for at least four seconds until the computer turns off.2. Disconnect the power cord from the electrical outlet.

Computer will not respond to USB keyboard or mouse.

Cause	Solution
Computer is in standby mode.	To resume from standby mode, press the power button or press any key. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.
System has locked up.	Restart computer.

Computer date and time display is incorrect.

Cause	Solution
RTC (real-time clock) battery may need to be replaced. NOTE: Connecting the computer to a live AC outlet prolongs the life of the RTC battery.	First, reset the date and time under Control Panel (Computer Setup can also be used to update the RTC date and time). If the problem persists, replace the RTC battery. See the <i>Hardware Reference Guide</i> for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.

Cursor will not move using the arrow keys on the keypad.

Cause	Solution
The Num Lock key may be on.	Press the Num Lock key. The Num Lock light should not be on if you want to use the arrow keys. The Num Lock key can be disabled (or enabled) in Computer Setup.

Table C-1 Solving General Problems (continued)

There is no sound or sound volume is too low.

Cause	Solution
System volume may be set low or muted.	<ol style="list-style-type: none">1. Check the F10 BIOS settings to make sure the internal system speaker is not muted (this setting does not affect the external speakers).2. Make sure the external speakers are properly connected and powered on and that the speakers' volume control is set correctly.3. Use the system volume control available in the operating system to make sure the speakers are not muted or to increase the volume.

Cannot remove computer cover or access panel.

Cause	Solution
Smart Cover Lock, featured on some computers, is locked.	<p>Unlock the Smart Cover Lock using Computer Setup.</p> <p>The Smart Cover FailSafe Key, a device for manually disabling the Smart Cover Lock, is available from HP. You will need the FailSafe Key in case of forgotten password, power loss, or computer malfunction. Order PN 166527-001 for the wrench-style key or PN 166527-002 for the screwdriver bit key.</p>

Poor performance is experienced.

Cause	Solution
Processor is hot.	<ol style="list-style-type: none">1. Make sure airflow to the computer is not blocked. Leave a 10.2-cm (4-inch) clearance on all vented sides of the computer and above the monitor to permit the required airflow.2. Make sure fans are connected and working properly (some fans only operate when needed).3. Make sure the processor heatsink is installed properly.
Hard drive is full.	Transfer data from the hard drive to create more space on the hard drive.
Low on memory.	Add more memory.
Hard drive fragmented.	Defragment hard drive.
Program previously accessed did not release reserved memory back to the system.	Restart the computer.
Virus resident on the hard drive.	Run virus protection program.

Table C-1 Solving General Problems (continued)

Poor performance is experienced.

Cause	Solution
Too many applications running.	<ol style="list-style-type: none">1. Close unnecessary applications to free up memory.2. Add more memory. Some applications run in the background and can be closed by right-clicking on their corresponding icons in the task tray. To prevent these applications from launching at startup, go to Start > Run (Windows XP) or Start > Accessories > Run (Windows Vista) and type <code>msconfig</code>. On the Startup tab of the System Configuration Utility, clear applications that you do not want to launch automatically.
Some software applications, especially games, are stressful on the graphics subsystem	<ol style="list-style-type: none">1. Lower the display resolution for the current application or consult the documentation that came with the application for suggestions on how to improve performance by adjusting parameters in the application.2. Add more memory.3. Upgrade the graphics solution.
Cause unknown.	Restart the computer.

System does not power on.

Cause	Solution
System unable to power on.	<p>Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, then:</p> <ol style="list-style-type: none">1. Check that the voltage selector, located on the rear of the power supply on some models, is set to the appropriate voltage. Proper voltage setting depends on your region.2. Remove the expansion cards one at a time and see if the system powers on.3. Replace the system board. <p>OR</p> <p>Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then:</p> <ol style="list-style-type: none">1. Check that the unit is plugged into a working AC outlet.2. Open hood and check that the power button harness is properly connected to the system board.3. Check that both power supply cables are properly connected to the system board.4. Replace the power button harness.5. Replace the power supply.6. Replace the system board.

Solving Power Problems

Common causes and solutions for power problems are listed in the following table.

Table C-2 Solving Power Problems

Power supply shuts down intermittently.

Cause	Solution
Voltage selector switch on rear of computer chassis (some models) not switched to correct line voltage (115V or 230V).	Select the proper AC voltage using the selector switch.
Power supply will not turn on because of internal power supply fault.	Contact an authorized service provider to replace the power supply.

Computer powered off automatically.

Cause	Solution
Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink is not properly attached to the processor.	<ol style="list-style-type: none">1. Ensure that the computer air vents are not blocked and the processor cooling fan is running.2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header.3. If fan is plugged in, but is not spinning, then replace the heatsink/fan assembly.4. Contact an authorized reseller or service provider.
Power failure (power supply is overloaded).	<ol style="list-style-type: none">1. Check that the voltage selector, located on the rear of the power supply (some models), is set to the appropriate voltage. Proper voltage setting depends on your region.2. Open the hood and ensure the power supply cable is seated into the connector on the system board.3. Check if a device is causing the problem by removing ALL attached devices (such as hard drives or optical drives, and expansion cards). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly.4. Replace the power supply.5. Replace the system board.

Solving Hard Drive Problems

Table C-3 Solving Hard Drive Problems

Hard drive error occurs.

Cause	Solution
Hard disk has bad sectors or has failed.	<ol style="list-style-type: none">1. In Microsoft Windows XP, right-click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.In Microsoft Windows Vista, right-click Start, click Explore, and right-click on a drive. Select Properties then select the Tools tab. Under Error-checking click Check Now.2. Use a utility to locate and block usage of bad sectors. If necessary, reformat the hard disk.

Disk transaction problem.

Cause	Solution
Either the directory structure is bad or there is a problem with a file.	<p>In Microsoft Windows XP, right-click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.</p> <p>In Microsoft Windows Vista, right-click Start, click Explore, and right-click on a drive. Select Properties then select the Tools tab. Under Error-checking click Check Now.</p>

Drive not found (identified).

Cause	Solution
Cable could be loose.	Check cable connections.
The system may not have automatically recognized a newly installed device.	See reconfiguration directions in the Solving Hardware Installation Problems on page 96 section. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem.
The device is attached to a SATA port that has been disabled in Computer Setup.	Run the Computer Setup utility and ensure SATA1 Controller is Enabled in the Advanced menu.

Computer will not boot from hard drive.

Cause	Solution
The device is attached to a SATA port that has been disabled in Computer Setup.	Run the Computer Setup utility and ensure SATA1 Controller is Enabled in the Advanced menu.

Table C-3 Solving Hard Drive Problems (continued)

Computer will not boot from hard drive.

Cause	Solution
Boot order is not correct.	Run the Computer Setup utility and change boot sequence in Boot > Boot Device Priority .
Hard drive is damaged.	See the Worldwide Limited Warranty for terms and conditions.

Computer seems to be locked up.

Cause	Solution
Program in use has stopped responding to commands.	Attempt the normal Windows "Shut Down" procedure. If this fails, press the power button for four or more seconds to turn off the power. To restart the computer, press the power button again.

Solving Media Card Reader Problems

Table C-4 Solving Media Card Reader Problems

Media card will not work in a digital camera after formatting it in Microsoft Windows XP or Microsoft Windows Vista.

Cause	Solution
By default, Windows XP and Windows Vista will format any media card with a capacity greater than 32MB with the FAT32 format. Most digital cameras use the FAT (FAT16 & FAT12) format and can not operate with a FAT32 formatted card.	Either format the media card in the digital camera or select FAT file system to format the media card in a computer with Windows XP or Windows Vista.

A write-protected or locked error occurs when attempting to write to the media card.

Cause	Solution
Media card is locked. Locking the media card is a safety feature that prevents writing to and deleting from an SD/ Memory Stick/PRO card.	If using an SD card, make sure that the lock tab located on the right of the SD card is not in the locked position. If using a Memory Stick/PRO card, make sure that the lock tab located on the bottom of the Memory Stick/PRO card is not in the locked position.

Table C-4 Solving Media Card Reader Problems (continued)

Can not write to the media card.

Cause	Solution
The media card is a read-only memory (ROM) card.	Check the manufacturer's documentation included with your card to see if it writable. Refer to the previous section for a list of compatible cards.
Media card is locked. Locking the media card is a safety feature that prevents writing to and deleting from an SD/Memory Stick/PRO card.	If using an SD card, make sure that the lock tab located on the right of the SD card is not in the locked position. If using a Memory Stick/PRO card, make sure that the lock tab located on the bottom of the Memory Stick/PRO card is not in the locked position.

Unable to access data on the media card after inserting it into a slot.

Cause	Solution
The media card is not inserted properly, is inserted in the wrong slot, or is not supported.	Ensure that the card is inserted properly with the gold contact on the correct side. The green LED will light if inserted properly.

Do not know how to remove a media card correctly.

Cause	Solution
The computer's software is used to safely eject the card.	Open My Computer (Windows XP) or Computer (Windows Vista), right-click on the corresponding drive icon, and select Eject . Then pull the card out of the slot. NOTE: Never remove the card when the green LED is flashing

After installing the media card reader and booting to Windows, the reader and the inserted cards are not recognized by the computer.

Cause	Solution
The operating system needs time to recognize the device if the reader was just installed into the computer and you are turning the PC on for the first time.	Wait a few seconds so that the operating system can recognize the reader and the available ports, and then recognize whatever media is inserted in the reader.

After inserting a media card in the reader, the computer attempts to boot from the media card.

Cause	Solution
The inserted media card has boot capability.	If you do not want to boot from the media card, remove it during boot or do not select the option to boot from the inserted media card during the boot process.

Solving Display Problems

If you encounter display problems, see the documentation that came with the monitor and the common causes and solutions listed in the following table.

Table C-5 Solving Display Problems

Blank screen (no video).

Cause	Solution
Monitor is not turned on and the monitor light is not on.	Turn on the monitor and check that the monitor light is on.
Bad monitor.	Try a different monitor.
The cable connections are not correct.	Check the cable connection from the monitor to the computer and to the electrical outlet.
You may have a screen blanking utility installed or energy saver features are enabled.	Press any key or click the mouse button and, if set, type your password.
You are using a fixed-sync monitor and it will not sync at the resolution chosen.	Be sure that the monitor can accept the same horizontal scan rate as the resolution chosen.
Computer is in standby mode.	Press the power button to resume from standby mode. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.
Monitor settings in the computer are not compatible with the monitor.	<ol style="list-style-type: none">1. In Windows XP Control Panel, double-click the Display icon and select the Settings tab.In Windows Vista Control Panel, under Appearance and Personalization, select Adjust screen resolution.2. Use the sliding control to reset the resolution.
Monitor is configured to use an input that is not active.	Use the monitor's on-screen menu controls to select the input that is being driven by the system. Refer to the monitor's user documentation for more information on the on-screen controls and settings.

Cannot enable integrated graphics after installing a PCI Express graphics card.

Cause	Solution
On systems with Intel integrated graphics, the integrated graphics cannot be enabled after installing a PCI Express x16.	The integrated graphics can be enabled in Computer Setup if a PCI Express x1 graphics card is installed, but it cannot be enabled if there is a graphics card in the PCI Express x16 slot.

Table C-5 Solving Display Problems (continued)

Blank screen and the computer emits one short beep then one long beep followed by a three second pause.

Cause	Solution
Pre-video memory error.	<ol style="list-style-type: none">1. Reseat DIMMs. Power on the system.2. Replace DIMMs one at a time to isolate the faulty module.3. Replace third-party memory with HP memory.4. Replace the system board.

Blank screen and the computer emits two short beeps then one long beep followed by a three second pause.

Cause	Solution
Pre-video graphics error.	<p>For systems with a graphics card:</p> <ol style="list-style-type: none">1. Reseat the graphics card. Power on the system.2. Replace the graphics card.3. Replace the system board. <p>For systems with integrated graphics, replace the system board.</p>

Monitor does not function properly when used with energy saver features.

Cause	Solution
Monitor without energy saver capabilities is being used with energy saver features enabled.	Disable monitor energy saver feature.

Dim characters.

Cause	Solution
The brightness and contrast controls are not set properly.	Adjust the monitor brightness and contrast controls.
Cables are not properly connected.	Check that the graphics cable is securely connected to the graphics card and the monitor.

Blurry video or requested resolution cannot be set.

Cause	Solution
If the graphics controller was upgraded, the correct graphics drivers may not be loaded.	Install the video drivers included in the upgrade kit.
Monitor is not capable of displaying requested resolution.	Change requested resolution.
Graphics card is bad.	Replace the graphics card.

Table C-5 Solving Display Problems (continued)

The picture is broken up, rolls, jitters, or flashes.

Cause	Solution
The monitor connections may be incomplete or the monitor may be incorrectly adjusted.	<ol style="list-style-type: none">1. Be sure the monitor cable is securely connected to the computer.2. In a two-monitor system or if another monitor is in close proximity, be sure the monitors are not interfering with each other's electromagnetic field by moving them apart.3. Fluorescent lights or fans may be too close to the monitor.
Monitor needs to be degaussed.	Degauss the monitor. Refer to the documentation that came with the monitor for instructions.

Image is not centered.

Cause	Solution
Position may need adjustment.	Press the monitor's Menu button to access the OSD menu. Select ImageControl/ Horizontal Position or Vertical Position to adjust the horizontal or vertical position of the image.

"No Connection, Check Signal Cable" displays on screen.

Cause	Solution
Monitor video cable is disconnected.	Connect the video cable between the monitor and computer. CAUTION: Ensure that the computer power is off while connecting the video cable.

"Out of Range" displays on screen.

Cause	Solution
Video resolution and refresh rate are set higher than what the monitor supports.	Restart the computer and enter Safe Mode. Change the settings to a supported setting then restart the computer so that the new settings take effect.

Vibrating or rattling noise coming from inside a CRT monitor when powered on.

Cause	Solution
Monitor degaussing coil has been activated.	None. It is normal for the degaussing coil to be activated when the monitor is powered on.

Table C-5 Solving Display Problems (continued)

Clicking noise coming from inside a CRT monitor.

Cause	Solution
Electronic relays have been activated inside the monitor.	None. It is normal for some monitors to make a clicking noise when turned on and off, when going in and out of standby mode, and when changing resolutions.

High pitched noise coming from inside a flat panel monitor.

Cause	Solution
Brightness and/or contrast settings are too high.	Lower brightness and/or contrast settings.

Fuzzy focus; streaking, ghosting, or shadowing effects; horizontal scrolling lines; faint vertical bars; or unable to center the picture on the screen (flat panel monitors using an analog VGA input connection only).

Cause	Solution
Flat panel monitor's internal digital conversion circuits may be unable to correctly interpret the output synchronization of the graphics card.	<ol style="list-style-type: none">1. Select the monitor's Auto-Adjustment option in the monitor's on-screen display menu.2. Manually synchronize the Clock and Clock Phase on-screen display functions.
Graphics card is not seated properly or is bad.	<ol style="list-style-type: none">1. Reseat the graphics card.2. Replace the graphics card.

Certain typed symbols do not appear correct.

Cause	Solution
The font you are using does not support that particular symbol.	Use the Character Map to locate and select the appropriate symbol. Click Start > All Programs > Accessories > System Tools > Character Map . You can copy the symbol from the Character Map into a document.

Solving Audio Problems

If the computer has audio features and you encounter audio problems, see the common causes and solutions listed in the following table.

Table C-6 Solving Audio Problems

Sound cuts in and out.

Cause	Solution
Processor resources are being used by other open applications.	Shut down all open processor-intensive applications.
Direct sound latency, common in many media player applications.	In Windows XP only: <ol style="list-style-type: none">From the Control Panel, select Sounds and Audio Devices.On the Audio tab, select a device from the Sound Playback list.Click the Advanced button and select the Performance tab.Set the Hardware acceleration slider to None and the Sample rate conversion quality slider to Good and retest the audio.Set the Hardware acceleration slider to Full and the Sample rate conversion quality slider to Best and retest the audio.

Sound does not come out of the speaker or headphones.

Cause	Solution
Software volume control is turned down or muted.	Double-click the Speaker icon on the taskbar, then make sure that Mute is not selected and use the volume slider to adjust the volume.
The external speakers are not turned on.	Turn on the external speakers.
The audio device may be connected to the wrong jack.	Ensure that the device is connected to the correct jack on the computer. The speakers should be plugged into the rear line-out jack and the headphones should be plugged into the front headphone jack.
External speakers plugged into the wrong audio jack on a recently installed sound card.	See the sound card documentation for proper speaker connection.
Digital CD audio is not enabled.	Enable digital CD audio. In the Device Manager, right-click on the CD/DVD device and select Properties . Make sure Enable digital CD audio for this CD-ROM device is checked.
Headphones or devices connected to the line-out connector mute the internal speaker.	Turn on and use headphones or external speakers, if connected, or disconnect headphones or external speakers.

Table C-6 Solving Audio Problems (continued)

Sound does not come out of the speaker or headphones.

Cause	Solution
Computer is in standby mode.	Press the power button to resume from standby mode. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.
Internal speaker is disabled in Computer Setup.	Enable the internal speaker in Computer Setup. Select Advanced > Internal Speaker .

Sound from headphones is not clear or muffled.

Cause	Solution
Headphones are plugged into the rear audio output connector. The rear audio output connector is for powered audio devices and is not designed for headphone use.	Plug the headphones into the headphone connector on the front of the computer.

Computer appears to be locked up while recording audio.

Cause	Solution
The hard disk may be full.	Before recording, make sure there is enough free space on the hard disk. You can also try recording the audio file in a compressed format.

Solving Printer Problems

If you encounter printer problems, see the documentation that came with the printer and the common causes and solutions listed in the following table.

Table C-7 Solving Printer Problems

Printer will not print.

Cause	Solution
Printer is not turned on and online.	Turn the printer on and make sure it is online.
The correct printer drivers for the application are not installed.	<ol style="list-style-type: none">1. Install the correct printer driver for the application.2. Try printing using the MS-DOS command: DIR C:\ > [printer port] where [printer port] is the address of the printer being used. If the printer works, reload the printer driver.
If you are on a network, you may not have made the connection to the printer.	Make the proper network connections to the printer.
Printer may have failed.	Run printer self-test.

Table C-7 Solving Printer Problems (continued)

Printer will not turn on.

Cause	Solution
The cables may not be connected properly.	Reconnect all cables and check the power cord and electrical outlet.

Printer prints garbled information.

Cause	Solution
The correct printer driver for the application is not installed.	Install the correct printer driver for the application.
The cables may not be connected properly.	Reconnect all cables.
Printer memory may be overloaded.	Reset the printer by turning it off for one minute, then turn it back on.

Printer is offline.

Cause	Solution
The printer may be out of paper.	Check the paper tray and refill it if it is empty. Select online.

Solving Keyboard and Mouse Problems

If you encounter keyboard or mouse problems, see the documentation that came with the equipment and the common causes and solutions listed in the following table.

Table C-8 Solving Keyboard Problems

Keyboard commands and typing are not recognized by the computer.

Cause	Solution
Keyboard connector is not properly connected.	<ol style="list-style-type: none">1. On the Windows XP Desktop, click Start > Shut Down. On the Windows Vista Desktop, click Start, click the arrow on the lower right corner of the Start menu, then select Shut Down.2. After the shutdown is complete, reconnect the keyboard to the back of the computer and restart the computer.
Program in use has stopped responding to commands.	Shut down your computer using the mouse and then restart the computer.
Keyboard needs repairs.	See the Worldwide Limited Warranty for terms and conditions.
Computer is in standby mode.	Press the power button to resume from standby mode. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.

Cursor will not move using the **arrow** keys on the keypad.

Cause	Solution
The Num Lock key may be on.	Press the Num Lock key. The Num Lock light should not be on if you want to use the arrow keys. The Num Lock key can be disabled (or enabled) in Computer Setup.

Table C-9 Solving Mouse Problems

Mouse does not respond to movement or is too slow.

Cause	Solution
Mouse connector is not properly plugged into the back of the computer.	Shut down the computer using the keyboard. <ol style="list-style-type: none">1. Press the Ctrl and Esc keys at the same time (or press the Windows logo key) to display the Start menu.2. Use the arrow keys to select Shut Down and then press the Enter key.3. After the shutdown is complete, plug the mouse connector into the back of the computer (or the keyboard) and restart.
Program in use has stopped responding to commands.	Shut down the computer using the keyboard then restart the computer.

Table C-9 Solving Mouse Problems (continued)

Mouse does not respond to movement or is too slow.

Cause	Solution
Mouse may need cleaning.	Remove the roller ball cover on the mouse and clean the internal components.
Mouse may need repair.	See the Worldwide Limited Warranty for terms and conditions.
Computer is in standby mode.	Press the power button to resume from standby mode. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.

Mouse will only move vertically, horizontally, or movement is jerky.

Cause	Solution
Mouse roller ball or the rotating encoder shafts that make contact with the ball are dirty.	Remove roller ball cover from the bottom of the mouse and clean the internal components with a mouse cleaning kit available from most computer stores.

Solving Hardware Installation Problems

You may need to reconfigure the computer when you add or remove hardware, such as an additional drive or expansion card. If you install a plug and play device, Windows automatically recognizes the device and configures the computer. If you install a non–plug and play device, you must reconfigure the computer after completing installation of the new hardware. In Windows, use the **Add Hardware Wizard** and follow the instructions that appear on the screen.

⚠️ WARNING! When the computer is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

Table C-10 Solving Hardware Installation Problems

A new device is not recognized as part of the system.

Cause	Solution
Device is not seated or connected properly.	Ensure that the device is properly and securely connected and that pins in the connector are not bent down.
Cable(s) of new external device are loose or power cables are unplugged.	Ensure that all cables are properly and securely connected and that pins in the cable or connector are not bent down.
Power switch of new external device is not turned on.	Turn off the computer, turn on the external device, then turn on the computer to integrate the device with the computer system.
When the system advised you of changes to the configuration, you did not accept them.	Reboot the computer and follow the instructions for accepting the changes.
A plug and play board may not automatically configure when added if the default configuration conflicts with other devices.	Use Windows Device Manager to deselect the automatic settings for the board and choose a basic configuration that does not cause a resource conflict. You can also use Computer Setup to reconfigure or disable devices to resolve the resource conflict.
USB ports on the computer are disabled in Computer Setup.	Enter Computer Setup (F10) and enable the USB ports in Advanced > USB Ports .
1394 ports on the computer are disabled in Computer Setup.	Enter Computer Setup (F10) and enable the 1394 ports in Advanced > Onboard 1394 .

Computer will not start.

Cause	Solution
Wrong memory modules were used in the upgrade or memory modules were installed in the wrong location.	<ol style="list-style-type: none">Review the documentation that came with the system to determine if you are using the correct memory modules and to verify the proper installation. NOTE: DIMM2 must always be installed.Listen for beeps from the computer. Beeps are codes for specific problems.If you still cannot resolve the issue, contact Customer Support.

Table C-10 Solving Hardware Installation Problems (continued)

The computer emits one short beep then one long beep followed by a three second pause.

Cause	Solution
Memory is installed incorrectly or is bad.	<p>CAUTION: To avoid damage to the DIMMs or the system board, you must unplug the computer power cord before attempting to reseat, install, or remove a DIMM.</p> <ol style="list-style-type: none">1. Reseat DIMMs. Power on the system.2. Replace DIMMs one at a time to isolate the faulty module. <p>NOTE: DIMM2 must always be installed.</p> <ol style="list-style-type: none">3. Replace third-party memory with HP memory.4. Replace the system board.

The computer emits two short beeps then one long beep followed by a three second pause.

Cause	Solution
Graphics card is not seated properly or is bad, or system board is bad.	<p>For systems with a graphics card:</p> <ol style="list-style-type: none">1. Reseat the graphics card. Power on the system.2. Replace the graphics card.3. Replace the system board. <p>For systems with integrated graphics, replace the system board.</p>

Solving Network Problems

Some common causes and solutions for network problems are listed in the following table. These guidelines do not discuss the process of debugging the network cabling.

Table C-11 Solving Network Problems

Wake-on-LAN feature is not functioning.

Cause	Solution
Wake-on-LAN is not enabled.	<p>To enable Wake-on-LAN in Windows XP:</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Double-click Network Connections.3. Double-click Local Area Connection.4. Click Properties.5. Click Configure.6. Click the Power Management tab, then select the check box to Allow this device to bring the computer out of standby. <p>To enable Wake-on-LAN in Windows Vista:</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Under Network and Internet, select View network status and tasks.3. In the Tasks list, select Manage network connections.4. Double-click Local Area Connection.5. Click the Properties button.6. Click the Configure button.7. Click the Power Management tab, then select the check box to Allow this device to wake the computer. <p>NOTE: Wake-on-LAN is only supported from the S1, S3 and S4 states. It is not supported from the S5 state.</p>

Network driver does not detect network controller.

Cause	Solution
Network controller is disabled.	<ol style="list-style-type: none">1. Run Computer Setup and enable network controller in Advanced > Onboard LAN.2. Enable the network controller in the operating system via Device Manager.
Incorrect network driver.	Check the network controller documentation for the correct driver or obtain the latest driver from the manufacturer's Web site.

Table C-11 Solving Network Problems (continued)

Network status link light never flashes.

NOTE: The network status light is supposed to flash when there is network activity.

Cause	Solution
No active network is detected.	Check cabling and network equipment for proper connection.
Network controller is not set up properly.	Check for the device status within Windows, such as Device Manager for driver load and the Network Connections applet within Windows for link status.
Network controller is disabled.	<ol style="list-style-type: none"> Run Computer Setup and enable network controller in Advanced > Onboard LAN. Enable the network controller in the operating system via Device Manager.
Network driver is not properly loaded.	Reinstall network drivers.
System cannot autosense the network.	Disable auto-sensing capabilities and force the system into the correct operating mode.

Diagnostics reports a failure.

Cause	Solution
The cable is not securely connected.	Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device.
The cable is attached to the incorrect connector.	Ensure that the cable is attached to the correct connector.
There is a problem with the cable or a device at the other end of the cable.	Ensure that the cable and device at the other end are operating correctly.
The network controller is defective.	Contact an authorized service provider.

Diagnostics passes, but the computer does not communicate with the network.

Cause	Solution
Network drivers are not loaded, or driver parameters do not match current configuration.	<p>Make sure the network drivers are loaded and that the driver parameters match the configuration of the network controller.</p> <p>Make sure the correct network client and protocol is installed.</p>
The network controller is not configured for this computer.	Select the Network icon in the Control Panel and configure the network controller.

Network controller stops working without apparent cause.

Cause	Solution
The files containing the network drivers are corrupted.	Reinstall the network drivers.

Table C-11 Solving Network Problems (continued)

Network controller stops working without apparent cause.

Cause	Solution
The cable is not securely connected.	Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device.
The network controller is defective.	Contact an authorized service provider.

New network card will not boot.

Cause	Solution
New network card may be defective or may not meet industry-standard specifications.	Install a working, industry-standard NIC, or change the boot sequence to boot from another source.

Cannot connect to network server when attempting Remote System Installation.

Cause	Solution
The network controller is not configured properly.	Verify Network Connectivity, that a DHCP Server is present, and that the Remote System Installation Server contains the NIC drivers for your NIC.

System setup utility reports unprogrammed EEPROM.

Cause	Solution
Unprogrammed EEPROM.	Contact an authorized service provider.

Solving Memory Problems

If you encounter memory problems, some common causes and solutions are listed in the following table.

△ **CAUTION:** Power may still be supplied to the DIMMs when the computer is turned off. To avoid damage to the DIMMs or the system board, you must unplug the computer power cord before attempting to reseat, install, or remove a DIMM.

For those systems that support ECC memory, HP does not support mixing ECC and non-ECC memory. Otherwise, the computer will not boot the operating system.

Table C-12 Solving Memory Problems

System will not boot or does not function properly after installing additional memory modules.

Cause	Solution
A memory module is not installed in the DIMM1 socket.	Ensure that a memory module is installed in the black DIMM1 socket on the system board. This socket must be populated with a memory module.
Memory module is not the correct type or speed grade for the system or the new memory module is not seated properly.	Replace module with the correct industry-standard device for the computer. On some models, ECC and non-ECC memory modules cannot be mixed.

Out of memory error.

Cause	Solution
Memory configuration may not be set up correctly.	Use the Device Manager to check memory configuration.
You have run out of memory to run the application.	Check the application documentation to determine the memory requirements.

Memory count during POST is wrong.

Cause	Solution
The memory modules may not be installed correctly.	Check that the memory modules have been installed correctly and that proper modules are used.
Integrated graphics may use system memory.	No action required.

Insufficient memory error during operation.

Cause	Solution
Too many Terminate and Stay Resident programs (TSRs) are installed.	Delete any TSRs that you do not need.
You have run out of memory for the application.	Check the memory requirements for the application or add more memory to the computer.

Table C-12 Solving Memory Problems (continued)

The computer emits one short beep then one long beep followed by a three second pause.

Cause	Solution
Memory is installed incorrectly or is bad.	<ol style="list-style-type: none">1. Reseat DIMMs. Power on the system.2. Replace DIMMs one at a time to isolate the faulty module.3. Replace third-party memory with HP memory.4. Replace the system board.

Solving CD-ROM and DVD Problems

If you encounter CD-ROM or DVD problems, see the common causes and solutions listed in the following table or to the documentation that came with the optional device.

Table C-13 Solving CD-ROM and DVD Problems

System will not boot from CD-ROM or DVD drive.

Cause	Solution
The device is attached to a SATA port that has been disabled in the Computer Setup utility.	Run the Computer Setup utility and ensure SATA1 Controller is Enabled in the Advanced menu.
Non-bootable CD in drive.	Try a bootable CD in the drive.
Boot order not correct.	<ol style="list-style-type: none">1. Run the Computer Setup utility and change the optical drive boot priority in Boot > Boot Device Priority > CD-ROM Group Boot Priority.2. Run the Computer Setup utility and change boot group sequence in Boot > Boot Device Priority.

Drive not found (identified).

Cause	Solution
Cable could be loose.	Check cable connections.
The system may not have automatically recognized a newly installed device.	See reconfiguration directions in the Solving Hardware Installation Problems on page 96 section. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem.
The device is attached to a SATA port that has been disabled in Computer Setup.	Run the Computer Setup utility and ensure SATA1 Controller is Enabled in the Advanced menu.

CD-ROM or DVD devices are not detected or driver is not loaded.

Cause	Solution
Drive is not connected properly or not properly configured.	See the documentation that came with the optional device.

Table C-13 Solving CD-ROM and DVD Problems (continued)

Movie will not play in the DVD drive.

Cause	Solution
Movie may be regionalized for a different country.	See the documentation that came with the DVD drive.
Decoder software is not installed.	Install decoder software.
Damaged media.	Replace media.
Movie rating locked out by parental lock.	Use DVD software to remove parental lock.
Media installed upside down.	Reinstall media.

Cannot eject compact disc (tray-load unit).

Cause	Solution
Disc not properly seated in the drive.	Turn off the computer and insert a thin metal rod into the emergency eject hole and push firmly. Slowly pull the tray out from the drive until the tray is fully extended, then remove the disc.

CD-ROM, CD-RW, DVD-ROM, or DVD-R/RW drive cannot read a disc or takes too long to start.

Cause	Solution
Media has been inserted upside down.	Re-insert the media with the label facing up.
The DVD-ROM drive takes longer to start because it has to determine the type of media played, such as audio or video.	Wait at least 30 seconds to let the DVD-ROM drive determine the type of media being played. If the disc still does not start, read the other solutions listed for this topic.
CD or DVD disc is dirty.	Clean CD or DVD with a CD cleaning kit, available from most computer stores.
Windows does not detect the CD-ROM or DVD-ROM drive.	<ol style="list-style-type: none">1. Use Device Manager to remove or uninstall the device.2. Restart the computer and let Windows detect the CD or DVD driver.

Recording or copying CDs is difficult or impossible.

Cause	Solution
Wrong or poor quality media type.	<ol style="list-style-type: none">1. Try using a slower speed when recording.2. Verify that you are using the correct media for the drive.3. Try a different brand of media. Quality varies widely between manufacturers.

Solving USB Flash Drive Problems

If you encounter USB flash drive problems, common causes and solutions are listed in the following table.

Table C-14 Solving USB Flash Drive Problems

USB flash drive is not seen as a drive letter in Windows.

Cause	Solution
The drive letter after the last physical drive is not available.	Change the default drive letter for the flash drive in Windows.

USB flash drive not found (identified).

Cause	Solution
The device is attached to a USB port that has been disabled in Computer Setup.	Run the Computer Setup utility and ensure USB Ports are Enabled in the Advanced menu.
The device was not properly seated before power-up.	Ensure the device is fully inserted into the USB port before applying power to the system

System will not boot from USB flash drive.

Cause	Solution
Boot order is not correct.	<ol style="list-style-type: none">1. Run the Computer Setup utility and change the removable media boot priority in Boot > Boot Device Priority.2. Run the Computer Setup utility and change boot group sequence in Boot > Boot Device Priority.
The image on the device is not bootable.	Follow the procedures described in the "Replicating the Setup" section of the <i>Service Reference Guide</i> .

The computer boots to DOS after making a bootable flash drive.

Cause	Solution
Flash drive is bootable.	Install the flash drive only after the operating system boots.

Solving Front Panel Component Problems

If you encounter problems with devices connected to the front panel, refer to the common causes and solutions listed in the following table.

Table C-15 Solving Front Panel Component Problems

A USB device, 1394 device, headphone, or microphone is not recognized by the computer.

Cause	Solution
Device is not properly connected.	<ol style="list-style-type: none">1. Turn off the computer.2. Reconnect the device to the front of the computer and restart the computer.
The device does not have power.	If the USB device requires AC power, be sure one end is connected to the device and one end is connected to a live outlet.
The correct device driver is not installed.	<ol style="list-style-type: none">1. Install the correct driver for the device.2. You might need to reboot the computer.
The cable from the device to the computer does not work.	<ol style="list-style-type: none">1. If possible, replace the cable.2. Restart the computer.
The device is not working.	<ol style="list-style-type: none">1. Replace the device.2. Restart the computer.
USB ports on the computer are disabled in Computer Setup.	Enter Computer Setup (F10) and enable the USB ports in Advanced > USB Ports .
1394 ports on the computer are disabled in Computer Setup.	Enter Computer Setup (F10) and enable the 1394 ports in Advanced > Onboard 1394 .

Solving Internet Access Problems

If you encounter Internet access problems, consult your Internet Service Provider (ISP) or refer to the common causes and solutions listed in the following table.

Table C-16 Solving Internet Access Problems

Unable to connect to the Internet.

Cause	Solution
Internet Service Provider (ISP) account is not set up properly.	Verify Internet settings or contact your ISP for assistance.
Modem is not set up properly.	Reconnect the modem. Verify the connections are correct using the quick setup documentation.
Web browser is not set up properly.	Verify that the Web browser is installed and set up to work with your ISP.
Cable/DSL modem is not plugged in.	Plug in cable/DSL modem. You should see a “power” LED light on the front of the cable/DSL modem.
Cable/DSL service is not available or has been interrupted due to bad weather.	Try connecting to the Internet at a later time or contact your ISP. (If the cable/DSL service is connected, the “cable” LED light on the front of the cable/DSL modem will be on.)
The CAT5 UTP cable is disconnected.	Connect the CAT5 UTP cable between the cable modem and the computer’s RJ-45 connector. (If the connection is good, the “PC” LED light on the front of the cable/DSL modem will be on.)
IP address is not configured properly.	Contact your ISP for the correct IP address.
Cookies are corrupted. (A “cookie” is a small piece of information that a Web server can store temporarily with the Web browser. This is useful for having the browser remember some specific information that the Web server can later retrieve.)	Windows Vista <ol style="list-style-type: none">1. Select Start > Control Panel.2. Click Network and Internet.3. Click Internet Options.4. In the Browsing history section on the General tab, click the Delete button.5. Click the Delete cookies button. Windows XP <ol style="list-style-type: none">1. Select Start > Control Panel.2. Double-click Internet Options.3. On the General tab, click the Delete Cookies button.

Cannot automatically launch Internet programs.

Cause	Solution
You must log on to your ISP before some programs will start.	Log on to your ISP and launch the desired program.

Table C-16 Solving Internet Access Problems (continued)

Internet takes too long to download Web sites.

Cause	Solution
Modem is not set up properly.	<p>Verify that the modem is connected and communicating properly.</p> <p>Windows XP</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Double-click System.3. Click the Hardware tab.4. In the Device Manager area, click the Device Manager button.5. Double-click Modems.6. Double-click Agere Systems PCI-SV92PP Soft Modem.7. On the General tab, click Diagnostics.8. Click Query Modem. A “Success” response indicates the modem is connected and working properly. <p>Windows Vista</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Click on System and Maintenance.3. Click on System.4. In the Tasks list, select Device Manager.5. Double-click Modems.6. Double-click Agere Systems PCI-SV92PP Soft Modem.7. On the General tab, click Diagnostics.8. Click Query Modem. A “Success” response indicates the modem is connected and working properly.

Solving Software Problems

Most software problems occur as a result of the following:

- The application was not installed or configured correctly.
- There is insufficient memory available to run the application.
- There is a conflict between applications.
- Be sure that all the needed device drivers have been installed.
- If you have installed an operating system other than the factory-installed operating system, check to be sure it is supported on the system.

If you encounter software problems, see the applicable solutions listed in the following table.

Table C-17 Solving Software Problems

Computer will not continue and no HP logo screen has appeared.

Cause	Solution
POST error has occurred.	See the Restore Kit or the Worldwide Limited Warranty for terms and conditions.

Computer will not continue after HP logo screen has appeared.

Cause	Solution
System files may be damaged.	Scan hard drive for errors.

“Illegal Operation has Occurred” error message is displayed.

Cause	Solution
Software being used is not Microsoft-certified for your version of Windows.	Verify that the software is certified by Microsoft for your version of Windows (see program packaging for this information).
Configuration files are corrupt.	If possible, save all data, close all programs, and restart the computer.

Interpreting Power LED and Beep Codes

This section covers the audible codes that may occur before or during POST that do not necessarily have an error code or text message associated with them.

- ⚠ **WARNING!** When the computer is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

Color	LED/Beep Activity	State/Message
Green	On	(S0) Computer on
Green	1 blink every 2 secs	(S1) Normal Suspend Mode
Green	1 blink every 2 secs	(S3) Suspend to RAM
Clear	Off	(S4) Suspend to Disk (if applicable)
Clear	Off	(S5) Computer off
Green	Green when flashing ROM	Boot block recovery with embedded video
Red	CPU Fan weak (RPM < 1000) or not turning. Display Warning message and long beep for 5 secs and shut down.	CPU thermal shutdown (weak CPU fan speed or not running)
Red	5 flashes, once per second, followed by 2 second pause. 5 beeps.	No memory installed/Pre-video memory error
Red	6 flashes, once per second, followed by 2 second pause. 6 beeps.	Graphics card error (Pre-video graphics error)
Red	8 flashes, once per second, followed by 2 second pause. 8 beeps.	System board failure or invalid ROM basing on checksum

Resetting the Password Jumper

To disable the power-on or setup password features, or to clear the power-on or setup passwords, complete the following steps:

1. Shut down the operating system properly, then turn off the computer and any external devices, and disconnect the power cord from the power outlet.

2. With the power cord disconnected, press the power button again to drain the system of any residual power.

⚠ **WARNING!** To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet, and allow the internal system components to cool before touching.

⚠ **CAUTION:** When the computer is plugged in, the power supply always has voltage applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.

Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

3. Remove the access panel.

4. Locate the BIOS password header and jumper labeled **PSWD**.

📋 **NOTE:** The password jumper is light green so that it can be easily identified. For assistance locating the password jumper and other system board components, see the *Illustrated Parts & Service Map* (IPSM) for that particular system. The IPSM can be downloaded from <http://www.hp.com/support>.

5. Remove the jumper.

6. Plug in the computer and turn on power.

7. When you see the HP logo screen, turn off the computer. This clears the current passwords.

8. Replace the jumper to its original position.

9. Replace the access panel.

10. Reconnect external equipment.

11. Plug in the computer and turn on power. Allow the operating system to start.

Resetting the CMOS Jumper

1. Turn off the computer and any external devices, and disconnect the power cord from the power outlet. The power must be disconnected from the system to clear CMOS.
2. Disconnect the keyboard, monitor, and any other external equipment connected to the computer.

⚠ **WARNING!** To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet, and allow the internal system components to cool before touching.

⚠ **CAUTION:** When the computer is plugged in, the power supply always has voltage applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.

Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. See the *Hardware Reference Guide* for more information.

3. Remove the access panel.

⚠ **CAUTION:** Resetting CMOS will restore the computer to factory defaults and will erase any customized information including passwords, asset numbers, and special settings.

4. Locate the header and jumper labeled **CMOS**.

📝 **NOTE:** Be sure you have disconnected the AC power cord from the wall outlet. The CMOS will not clear if the power cord is connected.

NOTE: The CMOS jumper is light green so that it can be easily identified. For assistance locating the CMOS jumper and other system board components, see the *Illustrated Parts & Service Map* (IPSM) for that particular system. The IPSM can be downloaded from <http://www.hp.com/support>.

5. Remove the CMOS jumper from pins 1 and 2 and put the jumper on pins 2 and 3. This clears CMOS.
6. Put the jumper back on pins 1 and 2.
7. Replace the access panel.
8. Reconnect the external devices.
9. Plug in the computer and turn on power.

📝 **NOTE:** Use Computer Setup to reset any special system setups along with the date and time.

Contacting Customer Support

For help and service, contact an authorized reseller or dealer. To locate a reseller or dealer near you, visit <http://www.hp.com>.

 **NOTE:** If you take the computer to an authorized reseller, dealer, or service provider for service, remember to provide the setup and power-on passwords if they are set.

Refer to the number listed in the warranty or in the *Support Telephone Numbers* guide for technical assistance.

D Specifications

Table D-1 Specifications

Desktop Dimensions		
Height	15.14 in	38.46 cm
Width	7.27 in	18.46 cm
Depth	16.36 in	41.55 cm
Approximate Weight		
	16.66 lb	7.56 kg
Temperature Range		
Operating	50° to 95°F	10° to 35°C
Nonoperating	-22° to 140°F	-30° to 60°C
Relative Humidity (noncondensing)		
Operating	10-90%	10-90%
Nonoperating (38.7°C max wet bulb)	5-95%	5-95%
Maximum Altitude (unpressurized)		
Operating	10,000 ft	3048 m
Nonoperating	30,000 ft	9144 m
NOTE: Operating temperature is derated 1.0° C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level; no direct sustained sunlight. Maximum rate of change is 10° C/Hr. The upper limit may be limited by the type and number of options installed.		
Heat Dissipation		
Maximum		
For 115V/60Mhz:		For 230V/50Hz:
250W PFC+ HV:		250W PFC+ HV:
164.8 W or 562.298 BTU/hr or 141.699 Kg-cal/hr		165.3 W or 564.004 BTU/hr or 142.129 Kg-cal/hr
300W PFC+ HV:		300W PFC+ HV:
172.5 W or 588.57BTU/hr or 148.32Kg-cal/hr		171.3 W or 584.476BTU/hr or 147.288Kg-cal/hr
300W 85% EFF:		300W 85% EFF
153.0W or 522.036 BTU/hr or 131.553Kg-cal/hr		152.4W or 519.989 BTU/hr or 131.037Kg-cal/hr

Table D-1 Specifications (continued)

Typical (idle)	For 115V/60Mhz	For 230V/50Hz
	250W PFC+ HV: 53.1W or 181.177 BTU/hr or 45.657Kg-cal/hr	250W PFC+ HV ATX: 49.8 W or 169.918 BTU/hr or 42.819Kg-cal/hr
	300W PFC+ HV: 55.1W or 188.001 BTU/hr or 47.376Kg-cal/hr	300W PFC+ HV: 54.5W or 185.954 BTU/hr or 46.86Kg-cal/hr
	300W 85% EFF: 46.4W or 158.317BTU/hr or 39.896Kg-cal/hr	300W 85% EFF: 45.77W or 156.167 BTU/hr or 39.354Kg-cal/hr
Power Supply	115V	230V
Operating Voltage Range	90-132 VAC	180-264 VAC
Rated Voltage Range	100-127 VAC	200-240 VAC
Rated Line Frequency	50-60 Hz	50-60 Hz
Power Output	300 W	300 W
Rated Input Current (maximum)¹	8A @ 100 VAC	4A @ 200 VAC

¹ This system utilizes a passive power factor corrected power supply. The power factor correction is present in the 230V operating mode only. This allows the system to pass the CE mark requirements for use in the countries of the European Union. This supply requires the use of an input voltage range select switch.

Index

Symbols/Numerics

24-pin power pin assignments 72

4-pin power pin assignments 70

A

access panel

removal and replacement 26

access panel, locked 81

audio connectors 3, 5

audio problems 91

B

battery

disposal 24

removal and replacement 61

beeps, error codes 77

C

cable connections 38

cable management 37

cable pinouts

SATA data 15

cautions

AC power 17

cables 23

cooling fan 22

electrostatic discharge 17

keyboard cleaning 21

keyboard keys 22

CD-ROM or DVD problems 102

chassis security kit 68

cleaning

computer 21

mouse 22

safety precautions 21

CMOS

resetting jumper 111

computer cleaning 21

connecting drive cables 40

connections

system board 38

connector pin assignments 69

country power cord set

requirements 76

Customer Support 77, 112

D

disassembly preparation 25

drive connectors 41

drives

connecting cables 40

installing 40

locations 39

removal and replacement 39

DVI connector 5

DVI pin assignments 72

E

electrostatic discharge (ESD)

preventing damage 18

error codes 77

ethernet

BNC pin assignments 69

expansion slot cover

removing 34

replacing 36

F

fan

power supply 22

removal and replacement 55

flash drive problems 104

front bezel

removal and replacement 27

front I/O device

removal and replacement 53

front panel components 3

front panel problems 105

G

general problems 80

grounding methods 18

H

hard drive

installing 49

proper handling 23

removing 46

SATA characteristics 15

hard drive problems 84

hardware installation

problems 78

headphone connector 3

headphone pin assignments 70

heat sink

removal and replacement 56

helpful hints 77

hood sensor 67

I

installing

drive cables 40

hard drive 49

media card reader 45

optical drive 43

Internet access problems 106

J

jumper

CMOS 111

password 110

K

keyboard

cleaning 21

keyboard connector 5

keyboard problems 94

L	PCI Express pin assignments 73 POST error codes 77 power cord set requirements country specific 76 power problems 83 power supply fan 22 removal and replacement 58 power switch/LED removal and replacement 54 preparation for disassembly 25 printer problems 92 problems audio 91 CD-ROM or DVD 102 flash drive 104 front panel 105 general 80 hard drive 84 hardware installation 78 Internet access 106 keyboard 94 Media Card Reader 85 memory 101 monitor 87 mouse 94 network 98 power 83 printer 92 software 108 processor removal and replacement 57	hard drive 46 media card reader 44 optical drive 42 PCI card 35 PCI Express card 35
M	media card reader features 4 installing 45 removing 44 Media Card Reader problems 85 memory populating sockets 30 removal and replacement 29 specifications 29 memory problems 101 microphone connector 3, 5 microphone pin assignments 69 monitor pin assignments 71 monitor connector 5 monitor problems 87 mouse cleaning 22 mouse connector 5 mouse problems 94	S safety and comfort 77 safety precautions cleaning 21 SATA connectors on system board 15 data cable pinouts 15 hard drive characteristics 15 screws, correct size 23 SDRAM (synchronous dynamic random access memory 29 security cable lock 64 hood sensor 67 HP Business PC Security Lock 65 HP Chassis Security Kit 68 padlock 64 serial connector 5 serial interface pin assignments 71 service considerations 22 serviceability features 2 software problems 108 servicing computer 22 spare part number tamper-resistant wrench 23 Torx T-15 screwdriver 22 specifications computer 113 memory 29 static electricity 17 system board removal and replacement 60 SATA connectors 15 system board drive connections 41
N	network connector 5 network problems 98	R recovery/reset button 3 removal and replacement access panel 26 battery 61 drives 39 fan 55 front bezel 27 front I/O device 53 heat sink 56 memory 29 power supply 58 power switch 54 processor 57 system board 60 removing expansion slot cover 34
O	operating guidelines 20 optical drive installing 43 removing 42 optical drive problems 102 overheating, prevention 20	T tamper-proof screws tool 23 temperature control 20
P	password resetting jumper 110 PCI card 35 PCI Express card 35	

tools, servicing 22
Torx T15 screwdriver 22

U

USB pin assignments 69
USB ports
 front panel 3
 rear panel 5

V

ventilation, proper 20
voltage switch 5

W

Wake-on-LAN feature 98